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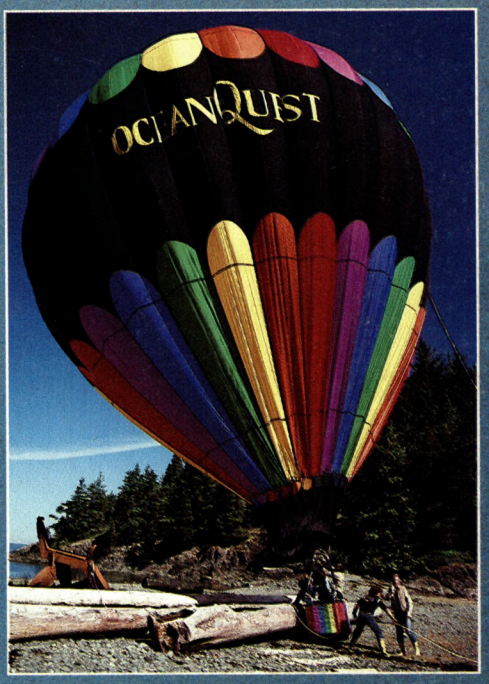

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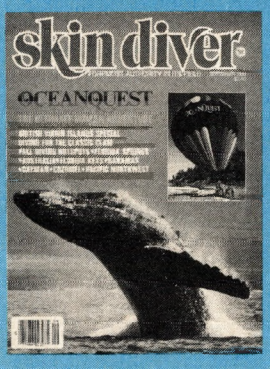

COVER
OceanQuest: NBC's mini-series on the ultimate human adventure is featured on page 28. Al Giddings and his crew spent 11 months filming marine animals such as this humpback whale off Alaska (photo/Rosemary Chastney). Unusual equipment was utilized including a hot air balloon (photo/Walt Clayton).

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SDM Editorial

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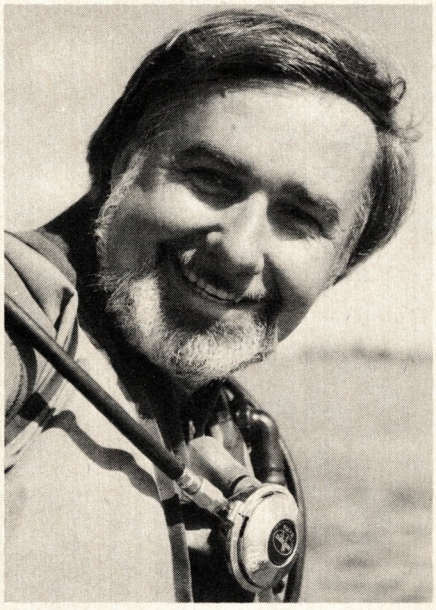

DIVE SAFETY THROUGH ADVANCED TRAINING

"How long does it take to become a fully qualified diver?" This seemingly simple question, asked by almost every neophyte, is difficult to answer.

The query penetrates the very heart of our sport and challenges our system of diver training. Ask the question and you may receive a dozen different answers, depending upon the diver being queried.

The answers can span an extremely diverse range. A lot depends on the geographic area involved, the specific underwater environment in which the diving will be done, the extent of the scuba training received, plus a half dozen more complex factors.

The most difficult point of such a question is that no standard has yet been established for determining precisely when a beginning diver has sufficient experience and training to be classified as a fully qualified diver, capable of handling any underwater situation safely. In fact, it is doubtful that any such standard could ever be established, since diving conditions can vary so widely.

One thing is for sure, a person just graduating from a basic open water scuba course is far from being considered a fully qualified diver. Yes, such a person has tasted the experience of open water diving and probably whetted his/her appetite, but the training and experience have been much too brief.

This situation gives us pause to worry, knowing full well that an estimated 250,000 people will be graduating from basic open water classes during 1985. Will they take care and proceed into the open water with caution, or will they set off, overconfident, and blunder into a really hairy dive situation that will give them a terrible scare?

The basic open water scuba class was never meant to be an end-all solution to diver training. It is intended to serve as a simple and economical method for a novice to learn diving safely and survive in the underwater environment. Most people who express an interest or curiosity in diving are really not prepared to spend thousands of dollars on equipment and lessons without a brief sampling of the sport. The "try it before you buy it" philosophy has led to the evolution of the basic open water scuba course in lieu of a far more expensive and lengthy comprehensive one.

Considering these factors, the question remains: How long does it take to become fully qualified? Perhaps three to four years without training, guidance and professional help. Some divers claim it takes a lifetime and that you never stop learning. However, the learning curve can be raised and perhaps shortened by the introduction of advanced training.

Basic open water scuba training is the start. After that comes advanced training consisting of another 12 to 15 open water dives under professional supervision, plus class lectures. Some of this training is in a specialty such as night or cave diving, etc. Then there should be a year of experience with other competent divers who go out regularly. After one and one-half to two years of this type of diving intensity, a person ascends to the competency level of divemaster. Some go on, becoming instructors. Others just enjoy.

The new wave in recreational diving is a definite trend toward advanced diver training classes. They are popping up everywhere from retail dive stores to Caribbean resorts. Some are in the form of long, comprehensive classes, while others consist of shorter specialty courses. There are also programs for learning to be a divemaster, an assistant instructor or an instructor.

SKIN DIVER Magazine recently conducted a national survey of its subscribers, published in the spring of 1985. This research document reports 43.8 percent of SDM's present readers have completed advanced diver training. Another 23.4 percent of the readers are planning to enroll in advanced diving classes during this year or next. These research figures indicate a 50 percent increase in advanced diver training enrollment when compared to the 1981 study.

The national scuba training agencies are reporting a booming business in advanced diver programs and an even greater proliferation of these courses. Every training agency has developed such courses and is currently promoting them as a health tonic for scuba safety. These claims may very well be true.

While advanced diver training is on the rise, scuba accidents seem to be on the decline. Advance research data distributed by the National Underwater Accident Data Center at the University of Rhode Island indicates a sharp decline in diving accidents. Unfortunately, this agency has run out of funding and no one is sure when the final report will be published. At present, we have a hypothetical correlation between the increase in advanced diver training and the decrease in accidents. While it is too early to verify a trend, the numbers are encouraging.

What does it all mean? The message is clear for the beginning diver. Enroll in an advanced dive training program and get more out of this wonderful sport. Be safe and enjoy!

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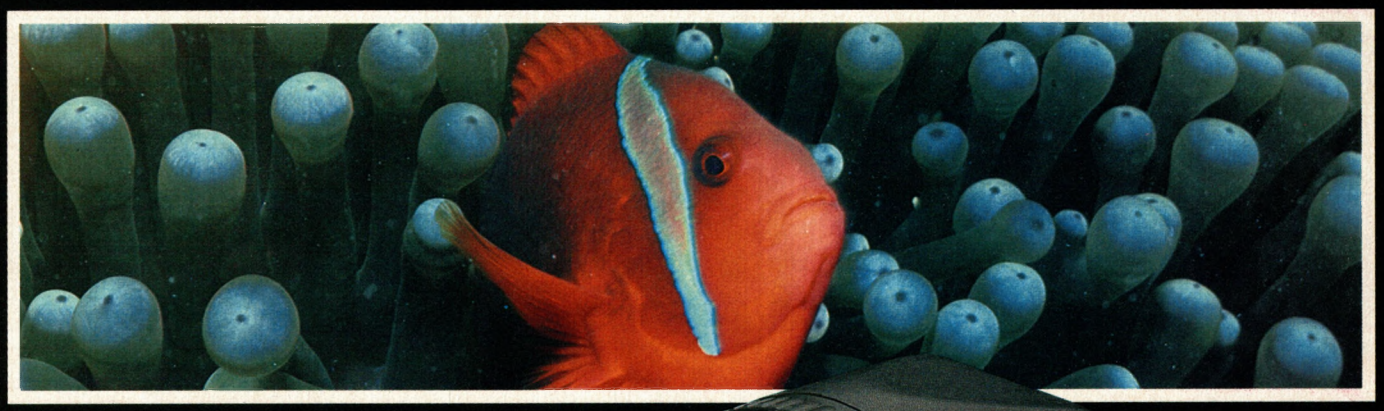

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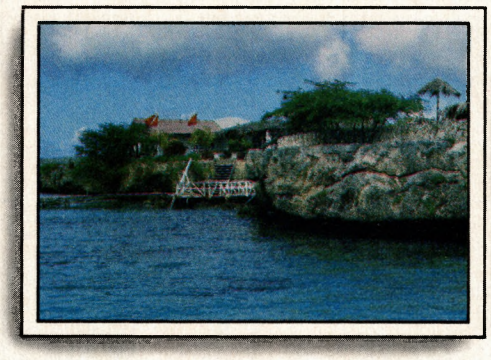

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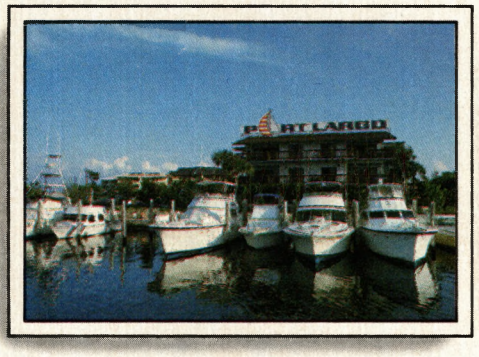

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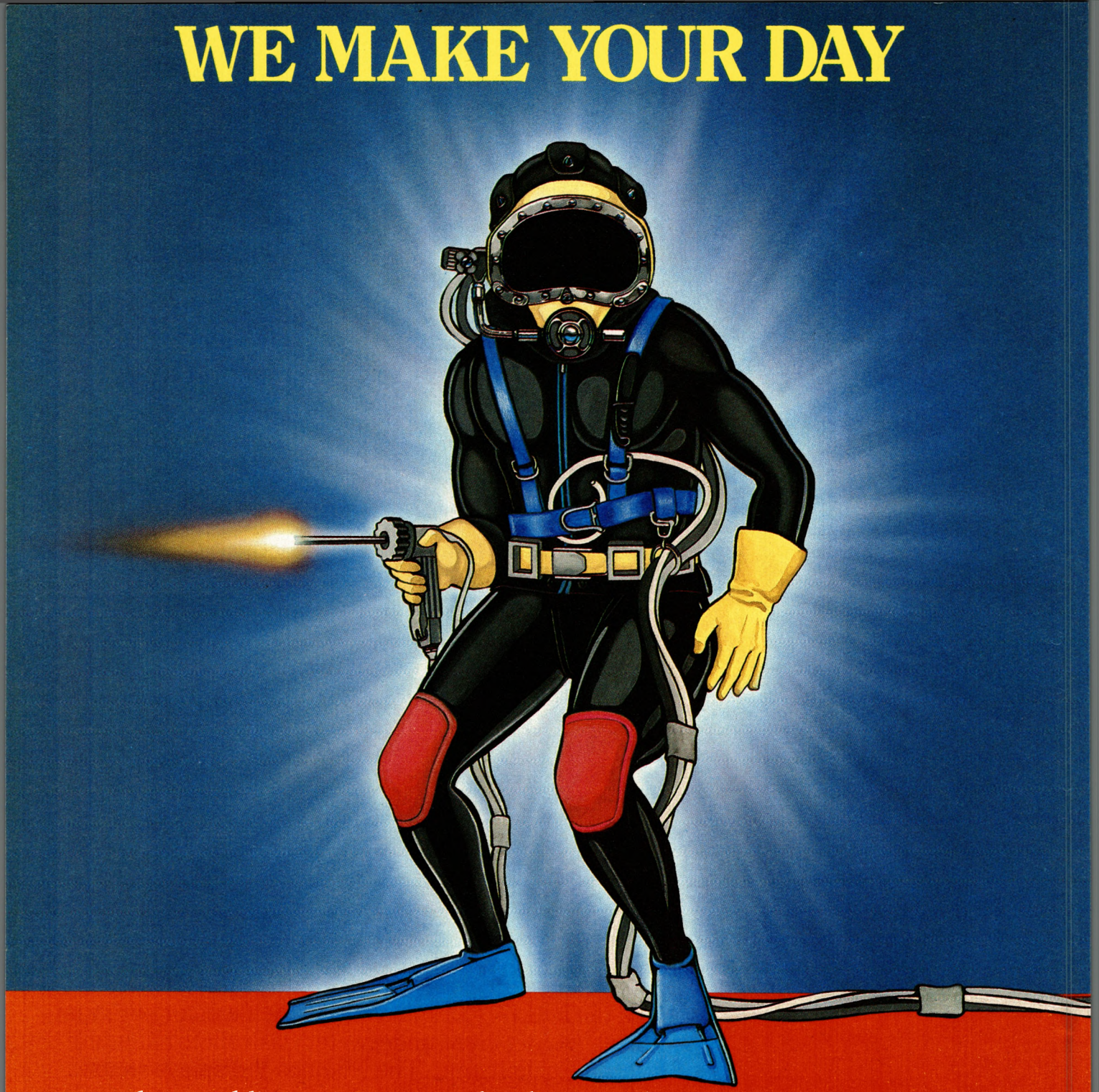

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Scuba Quiz

Category: Diving Physics

Topic: Definitions

By Dennis Graver

During your entry level training in diving you may not have been exposed to much of the theory of diving physics, or you may have only been required to remember "cause and effect." At some point in your diving education, however, you should become familiar with the laws and principles of physics. This is necessary because the advanced literature you will want to read requires it. Test yourself. Match the terms to the definitions, then reference the answers on the next page.

Words to be Matched: Write the letter of each word in the blank corresponding to its definition. There may be more than one that matches.

A. Absolute Pressure
B. Absolute Temperature
C. Ambient Pressure
D. Amonton's Law
E. Archimedes' Principle
F. Amagat's Law
G. Boyle's Law

H. Charles' Law
I. Conduction
J. Dalton's Law
K. Density
L. Gauge Pressure
M. Henry's Law
N. Partial Pressure

O. Pasqual's Principle
P. Poiseuille's Law
Q. Pressure
R. Refraction
S. Snell's Law
T. Specific Gravity
U. Specific Heat

1. _____ The pressure of a given quantity of gas at a constant temperature varies inversely with its volume.

2. _____ The volume of a gas at a constant pressure is proportional to the absolute temperature.

3. _____ The pressure of a fixed amount and volume of gas is proportional to the absolute pressure.

4. _____ The pressure exerted by one gas only, in a mixture of gases.

5. _____ The amount of gas that will dissolve in a liquid at a given temperature is proportional to the partial pressure of the gas.

6. _____ The force per unit area.

7. _____ The weight per unit volume of a substance.

8. _____ The pressure of the fluid surrounding an object.

9. _____ The pressure of a gas with a vacuum used as the zero reference.

10. _____ The pressure of a gas with atmospheric pressure used as the zero reference.

11. _____ The lowest possible temperature that a substance can achieve.

12. _____ An object immersed in a liquid is buoyed up by a force equal to the weight of the displaced liquid.

13. _____ Pressure is transmitted in all directions in a confined fluid.

14. _____ The density of a specific substance compared to that of pure water.

15. _____ The amount of heat required to raise the temperature of a specific substance compared to that of pure water.

16. _____ The mathematical ratio expressing the light "bending" effect of a medium.

17. _____ -460° Fahrenheit or -273° Centigrade.

18. _____ The deflection from a straight path by a ray of light in passing from one medium into another.

19. _____ A formula used to determine the rate at which gas flows through limiting enclosures.

20. _____ The total pressure exerted by a mixture of gases is the sum of the pressures exerted by the gases individually.

21. _____ The transmission of heat by direct material contact.

22. _____ The volume of a mixture of gases is the sum of the volumes of the individual gases and is determined by the pressure and temperature of the mixture.

Scuba Quiz

Answers: Definitions

1. G. With Boyle's Law, as the pressure increases, the volume decreases and vice versa.

2. H. Many people confuse the law of Charles and Gay Lussac with Amonton's Law.

3. D. Charles' Law says the *volume* varies with temperature while Amonton's Law says the *pressure* varies with temperature.

4. N. Partial pressure (PP) is the proportion of the total pressure contributed by a single gas in a gas mixture, e.g., the PP of oxygen in air is approximately 21 percent.

5. M. The amount of gas that will dissolve in a liquid at a given pressure is also dependent upon the solubility coefficient of the gas in the particular fluid. Henry's Law explains nitrogen absorption by divers.

6. Q. An example of pressure being force per unit area is pounds per square inch.

7. K. An example of density is pounds per cubic foot, e.g., the density of salt water is 64 lbs./cu. ft.

8. C. Ambient means "immediately surrounding" and is generally used when speaking of temperature or pressure.

9. A. Absolute pressure is the "true" or total pressure being exerted at any point and includes atmospheric pressure.

10. L. Gauge pressure is the difference between absolute pressure and a specific pressure being measured. It is converted to absolute pressure by adding 14.7 psi.

11. B. Temperature must be converted to absolute zero for use with the gas laws. Absolute zero is a hypothetical temperature characterized by complete absence of heat.

12. E. Archimedes' Principle explains the nature of buoyancy and helps us understand how to control it.

13. O. Pressure is transmitted in all directions in a fluid if the fluid is confined.

14. T. The tendency of a substance to float—or not to float—in water is indicated by its specific gravity, a number assigned on the basis of the ratio of the density of the substance to the density of fresh water.

15. U. Specific heat is the ratio of the amount of heat transferred to raise a unit mass of a substance one degree to that required to raise a unit mass of water one degree.

16. S. Snell's Law allows mathematicians to calculate refractive index, which is 1.33 for water and 1.5 for glass.

17. B. The lowest temperature attainable. See answer 11.

18. R. Light travels in straight lines except when it crosses from a medium of one refractive index into a medium of another refractive index, e.g., from air into water. This "bending" of light rays is called refraction.

19. P. Poiseuille's Law of laminar flow is used to determine the rate at which gas flows through orifices, hoses, etc., but is useful only in relatively simple systems where flow is laminar.

20. J. The total pressure exerted by a mixture of gases is the sum of the pressures that would be exerted by each of the gases if it alone were present and occupied the total volume.

21. I. A typical example of conduction is the heating of the handle of a pot on a stove. The heat is transmitted from the pan to the handle by direct material contact. Heat is similarly conducted away from divers underwater.

22. F. Each component of a gas mixture occupies a *volume* determined by the pressure and the temperature of the mixture regardless of the other components involved. See answer 20. Amagat's Law deals with volume, while Dalton's deals with pressure.

Rating: 15 correct = Average, 16-18 correct = Very Good, 19-20 correct = Excellent

Divers at the advanced level should be familiar with the concepts contained in this quiz. Since all of us should qualify as advanced divers, all should learn these laws and principles of physics. Why? Simply because an understanding of the theory allows better practical performance. There are many fundamental concepts you needed to learn at the beginning of your training and you could not relate this higher level theory to the practical. As an experienced diver, you can and should devote time to learning such theory because you can and should apply it to the practical.

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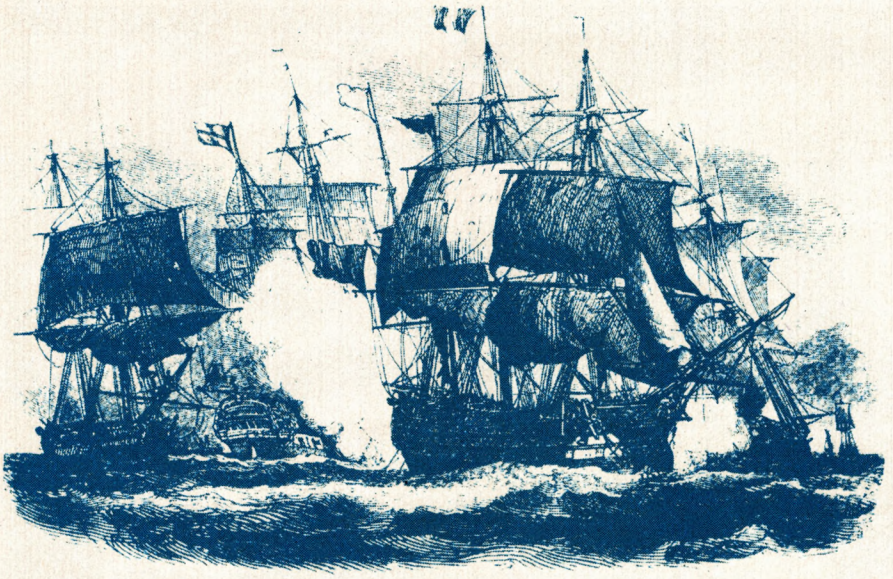

Wreck Facts

BY ELLSWORTH BOYD

Underwater New York's 14th Annual show at the Holiday Inn in Auburn was one of the best ever, featuring shipwrecks and other enticing dive sites. Divers and their guests marveled at the multi-media slide show about the *U-853*, a German U-boat sunk six miles southeast of Block Island, Rhode Island. Diver Norm Skinner narrated the fascinating history of the Nazi sub that was sunk on May 6, 1945, the last day of World War II. Skinner, with the help of Scott Jenkins, Ken Smith and Captain Larry Keen, researched German archives for several years in order to officially document the story they call: *U-853*—A Gray Wolf Revisited. Skinner's exhibit included a hydrometer the captain used to measure the salinity of the water in order to control the buoyancy of the *U-853*, a battery checker that still works, a device to tell how far the periscope was protruding from the surface and personal items from the captain's and crew's quarters.

Rosemary Nesbitt, director of the H. Lee White Maritime Museum, delighted the audience with tales of attempted salvage on a steam driven barge sunk in the Oswego Canal. Barges and other vessels sailed down the canal and turned west to the Great Lakes, laden with salt, hides and miscellaneous supplies from Syracuse. Nesbitt said the Oswego Canal was built in 1828 and more than 100 ships are sunk there and in Oswego Harbor.

Joe Zarzynski's slide presentation, Wellington Bomber of Loch Ness, proved there is more to the famous body of water than Nessie, the elusive monster. The Loch Ness Wellington is a World War II twin engine bomber ditched in 1940 during a training exercise and only the second Wellington bomber out of 11,000 to have survived over the years. Plans are to raise it as funds become available.

Dr. Dan Odell, University of Miami mammal expert, spoke on the need for further protection of manatees. Instructor Paula Krause gave a presentation, Dutch Spring Diving, that included slides of this clear lake near Allentown, Pennsylvania, that has become a popular diving and recreational facility.

Bob Marx needs help. The popular diver, marine archaeologist and author is fighting to preserve the shipwrecks of Cadiz. He is trying to persuade the government of Spain to recognize and protect wrecks that go back to 1200 B.C. in the Bay of Cadiz. Since that time, ships of every description and cargo have sailed into the harbor: Phoenician, Greek, Roman, Viking and Venetian. Although many sailed out, the Bay of Cadiz is reported to have at least 2,500 shipwrecks buried in muddy graves.

Marx says: "As the ships sank into murky waters, they settled into the mud that has preserved them for centuries. Anaerobic sediments sealed them off from oxygen, therfore no worms or microorganisms could consume the wooden timbers. We uncovered parts of the hull of a Roman ship and others from a 17th century vessel and they all looked like they were cut yesterday. When wood from ancient vessels has been protected like this, we can tell so much about the ship: how it was built, what it was transporting and why it sank. Best of all, there's the possibility of salvaging and reconstructing an entire ship and preserving much of its cargo."

Marx is trying to persuade the Spanish government to declare a portion of the bay a national monument, but time is critical. Dredge and fill operations for the development of the port have already begun. Cadiz is growing so rapidly it will eventually become one of Europe's most important seaports. Marx has formed a team, many of them Spaniards, to excavate some of the wrecks, but he still doesn't have full clearance from a procrastinating Spanish government. If you would like to help Bob, write to the Ambassador to Spain, c/o Spanish Embassy, Washington, DC, and ask that a portion of the port of Cadiz be declared a national monument.

Jeff Selis, Davis, California, asks about the wreck of the *Brother Jonathan* that went down off Crescent City, California, in 1865. The *Jonathan*, a passenger and cargo steamer, struck a jagged rock about ten miles northwest of Crescent City and sank in less than an hour with a loss of more than 100 lives. Captain S.J. DeWolf, cursing, "Damn the high waves," had little warning when a storm forced his vessel into a surging trough. The ship's boilers flooded when she hit the rocky pinnacle; her doors sprung and jammed, while the forward mast dropped through the ship's bottom, halting only when its yardarm struck the deck. Seventeen people survived the disaster despite ten foot waves and swirling seas. The bell from the *Brother Jonathan* washed ashore attached to other wreckage and is on display at the Light House Museum, Crescent City. A large wooden eagle that adorned the wheelhouse was salvaged and donated to the San Francisco Maritime Museum. There are rumors of various treasures aboard the *Jonathan*. Wells Fargo agent Joseph Lord locked $250,000 in the ship's safe. Purser John Benton locked another $80,000 of the passengers' money and valuables in the safe. A military courier, Major E.W. Eddy, was transporting a $200,000 payroll for soldiers stationed at Fort Vancouver. He also had a horse and two camels aboard. All three animals washed ashore one week after the disaster, but none of the money was found.

Lee Spence, author, historian, sport diver and marine archaeologist, has completed two massive volumes: *Shipwrecks of South Carolina and Georgia*. A compilation of nearly 20 years of research, the volumes—each nearly 400 pages thick—cover Spence's List: 1520-1865. The list includes the *Georgiana, Hunley, Central America, Delia Maria,* vessels of the Stonefleets and many other popular wrecks. The volumes are not for sale but are available for research from the Library of Congress, Washington, DC; State Library, Columbia, South Carolina; College of Charlestown Library; and the University of South Carolina Library. Spence has plans to edit and publish his work in a glossy bookstore edition.

Monica Foster, Papua New Guinea, is trying to locate an American diver, Bob Scott, who dove Rabaul Harbor in 1969. Monica is gathering info on wrecks of Ra-

(Continued on Page 123)

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DIVING MEDICINE

BY ALFRED A. BOVE, M.D., PH.D.

The future of diving will depend on advances in medical research and in new technology. Since our existence underwater depends on continued life support, we will always rely heavily on the equipment we use. This month I am going to describe a diving trip 50 years in the future, attempting to relate the research and technical advances of today to sport diving of the future.

The two hour flight from the mainland to Hawaii has just landed and your guide is waiting to gather everyone for a briefing on the week's diving program. At the briefing you are instructed in saturation diving, the necessity of avoiding excursions to the surface from the underwater habitat and a few rules about life in a habitat. Everyone is provided with a small bottle of ear drops to avoid external otitis during the trip. Directions on using the mixed gas scuba are provided in advance of the evening practical class. The conversation drifts between voice changes while under pressure and the idea that you will be doing three and four hour dives without any immediate need for decompression.

You board a hydrofoil for the trip to the habitat, offshore in 60 feet of water on a coral reef. As the boat approaches the habitat area, you notice a platform with an elevator shaft rising from the center. Leaving the boat, you get another briefing about descending in the "elevator." Here, the dive will actually begin. Six people enter the elevator and it is suddenly apparent it is really a diving bell. When the doors close, the bell begins its descent. Air is compressed as the bell descends. When it finally stops, a rush of air precedes the opening of the door into a short tunnel that leads to the airlock. Once inside, the habitat door is closed, the bell returns to the surface and you are ushered into a hotel-like environment. The desk clerk checks you in, assigns your room and points the way to another elevator. This is a three level habitat with living space for 20 divers and a support crew of 12.

Dinner that evening is food grown on the seafloor in a nearby marine farm. Fresh fruit is provided to ensure an adequate fluid and vitamin supply. The atmosphere in the habitat is 90 percent nitrogen, 10 percent oxygen, designed to avoid oxygen injury to the body. The same mixture is used in the mixed gas scuba now being demonstrated in the combined dining room-lecture hall.

The breathing unit has a built-in computer that keeps the oxygen partial pressure constant. It automatically adjusts the mixture to keep the PO_2 a constant 0.3 at any depth. Your divemaster explains that diving at 60 feet will saturate your tissues with an increased amount of nitrogen, but this environment will allow unlimited diving down to 150 feet and up to 40 feet without needing decompression stops. Of course, at the end of the week, you will need 36 hours of decompression before returning to the surface.

After learning to check your CO_2 absorption canister and to read the LED display in your helmet to determine depth, time, O_2 partial pressure and water temperature, you are instructed to try one of the diving helmets and learn to clear your ears without pinching your nose. After this drill and handling the scuba gear, you inquire about its light weight. This is a new sport scuba rig, adapted from commercial units that extract oxygen from the water. There is only a small cylinder of nitrogen to form the proper gas mixture. Oxygen is extracted from the water by a plastic membrane that contains hemoglobin—the oxygen-carrying molecule in the blood. The new scuba extracts oxygen, mixes it with nitrogen in the right proportions and sends it to your mouthpiece. You could spend 12 hours on this rig and that limit is only because the CO_2 absorber has to be replaced.

Your room looks out on the reef and a spotlight over the window gives you a night dive perspective from inside the habitat. There is a shower, toilet and sink with fresh, running water obtained from a catalytic distiller that converts sea water to fresh.

The first dive of the day is a two hour checkout and shallow exploration dive. You dress in a light, flexible drysuit made to be almost skintight, lock the helmet on the neck ring and check out the scuba with your divemaster and buddy. Your divemaster hands you an emergency hose that snaps into a fitting on your chest, to supply breathing gas in case of a scuba failure. These hoses are used to connect you to a remote gas supply at safety stations all around the reef. A spare hose is tucked in a pocket of your scuba rig jacket to cross connect you and your buddy if a rig should fail. Everything checks out, so you drop through a small circle of water in the floor of the dressing room and you are out in the sea.

Your photography will be done with a small video camera and a bright light with a 12 hour battery life. The camera is electronically adjusted to restore proper color to your photography. To record the video, a one centimeter cube of solid state memory is inserted in the camera. It will store four hours of video. Your camera will take film quality pictures that will be the topic of an evening review.

When the dive is over, your group has lunch, then makes a trip in a minisub. This is a plexiglass hulled vehicle, with small wings and water jet propulsion. The ten passengers and two crew can ride the sub to 3,000 feet. Pressure inside is kept at two atmospheres through the dive and no decompression is needed because the pressure has not changed. The deep excursion produces a number of prize TV scenes of marine life and everyone will get a memory cube containing the TV record of the trip.

When the two hour excursion ends you realize much of the marine life just visited is never seen using scuba gear. After dinner the reef around the habitat is illuminated with a soft light and large ports allow continuous observation. The TV is available for entertainment, but the interesting part of the evening comes when each member of the group replays his/her pictures of the dive on the large screen TV projector. The theater-sized screen provides a good way to discuss photographic technique and be ready for better pictures the next day. As usual, a few cameras and lights were flooded and the late evening finds a few divers in the shop getting help to repair their equipment for the next day.

The next few mornings are spent making dives to 150-160 feet on a no decompression schedule. The afternoon minisub excursions are getting to be routine. Two days of bad weather and rough seas go unnoticed except for the slightly reduced ambient light and a barely perceptible surge at 50 feet. On day five, it is time to begin the 36 hour decompression needed to return to the surface. The decompression will be done in the habitat, which will have its pressure reduced to one atmosphere slowly and continuously

(Continued on Page 120)

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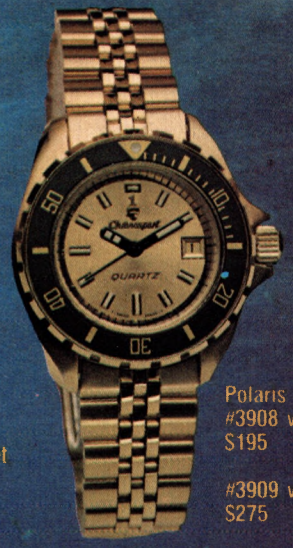

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Technifacts

BY E.R. CROSS

The genesis of national communication among sport divers occurred with SKIN DIVER Magazine in California in 1951. Not that there were no dive magazines before SKIN DIVER—there were but they had a limited and specialized circulation. The U.S. Navy Salvage School published a Navy monthly called Descending Line as early as 1942. This was later renamed and still exists as The Faceplate. However, the first dive publication called Faceplate was not published by the Navy. A year prior to the first issue of SKIN DIVER the Sparling School of Deep Sea Diving (which I owned and operated) published an in-house organ called Faceplate. In the decades since the proliferation of diving as a sport, dozens of diving and dive related publications have come and gone.

One area of uncertainty in practically all those publications has been the assignment of words to describe accurately the many kinds of divers who have evolved over the years. At first they were either sport, commercial or military divers. But that turned out to be impractical as new equipment and techniques put divers to use in other underwater occupations. Commercial divers began using sport diving equipment. Sport divers began using sophisticated gear once thought the province of only military divers. Then sport divers found out about deep diving and cave diving and other reasons for going underwater. They also invented such phrases as "master scuba diver." And, so it went, on and on.

Possibly, it would prove interesting and serve to keep us discussing and thinking about the same kinds of divers, if we were to define the words and phrases that resulted from this proliferation of diving categories.

First the basics! What is a diver? The definition I like best is, "A a person who goes underwater and remains for a considerable period of time." The key words there are, "for a considerable period of time." But, then it must be asked, "What is a considerable period of time?" For a breath-hold diver this might be two to three minutes, perhaps slightly longer for a commercial breath-hold diver such as

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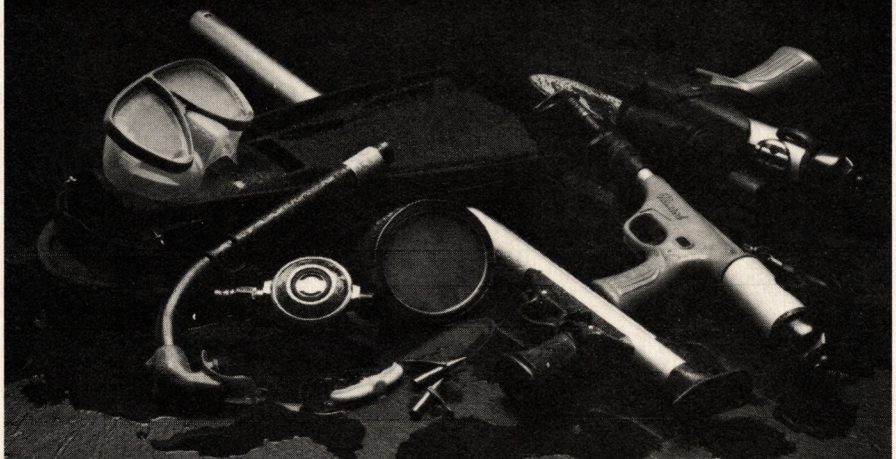

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TECHNIFACTS

those who still free dive for sponges or pearl shells. For an oil-patch saturation diver, a considerable period of time is 30 days under continuous pressure.

It is apparent from the preceding short paragraph that any discussion of diving can introduce several words or phrases that denote diving. Since people go underwater for a wide variety of reasons it is impractical to name a kind of diver for each mission undertaken. Also, since divers use a wide variety of equipment to help them achieve their objective of remaining underwater for a considerable period of time, it is equally impractical to designate the types of divers by the kind of gear they wear.

Again, basics may help solve this problem. A *sport diver* is someone who goes underwater for sport or as a hobby regardless of the type of gear used. In my early years of sport diving in California (about 1947) my boat was equipped with two complete sets of helmet gear we used for "sport diving." Breath-hold divers sometimes joined us at shallow depths for whatever period they could hold their breaths.

Using the same helmet diving equipment but working on a construction or salvage job, we became *commercial divers*. Our equipment and skills were used to make a profit. In the early 1950s scuba came into use and our second diver was often a commercial scuba diver.

Most of our helmet equipment in those early post-war years was Navy surplus gear. Those who used that equipment, before it became surplus, were military divers. But military divers used a lot of other kinds of equipment: oxygen rebreathers for stealth, open water helmets for quick jobs, or sport diving masks for light operations. Some of the gear used surface supplied air, some was self-contained. But all divers were members of military organizations and were, broadly speaking, military divers.

Another group of people who use many types of gear in their work are the *open sea divers*. These divers are harvesters of the sea's products. They gather abalone, kelp, sea urchins, sponges, pearl shells and other products they sell.

A group that has grown in numbers in the past few decades is the *research diver*. They engage in various forms of research, such as biological, geological, archaeological or other disciplines. More on research diving later.

A group of divers that has been around for more than a century are *bell divers*, i.e., those who work underwater but are inside a bell of some kind at atmospheric pressure. In recent years there has been a resurgence in the use of this type equipment in the form of JIM suits, SAM, WASP and others. Some of this equipment is capable of reaching depths in ex-

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cess of 2,000 feet. The thing all of these rigs have in common is that the diver is not subjected to the pressure of the water at depth. Some of these systems are basically small diving bells. Others are more sophisticated and could be called articulated diving bells since the arm and leg sections of the suit are jointed and movable. Others are maneuverable by the use of thrusters.

Within the six basic classes of divers—sport, commercial, military, open sea, research and bell—are a number of kinds of divers labeled by the type of equipment used and their overall qualifications. Sport divers, more than any other group, have been prolific in their creation of kinds of divers. This is understandable since they are greater in numbers and in reasons for diving than any other group. Training classes have been developed and ratings established for night, cave and rough water divers, to mention only a few. Nearly all sport divers use basically the same open circuit scuba.

The class, commercial diver, consists of construction, salvage, dam, offshore oil and a few other kinds of divers. The one thing they have in common is that they make their living underwater. Most commercial divers working in the United States are members of a labor organization, most often the United Brotherhood of Carpenters and Joiners, and, in some cases, the Bridge Dock and Wharf Builders of that organization. In Hawaii, and possibly other areas, commercial divers are members of the Operating Engineers. Commercial divers use nearly every kind of diving equipment that has ever been developed. For heavy construction there is still a slight preference for the conventional helmet gear. For work involving inspection and a great deal of mobility, various kinds of bandmasks and lightweight helmets have been developed. Another key requirement in commercial diving is a good communication system between divers and topside personnel. Since commercial divers frequently have heavy objects being lowered to them or moved, they need reliable and instant communication with crane operators and other topside personnel. Lack of reliable communications could prove fatal.

In offshore oil some divers are also qualified as bell divers and are, in many cases, being trained to operate the remote controlled, unmanned devices to perform underwater tasks. In civilian diving almost all saturation diving is conducted commercially, predominantly in offshore oil work.

Military divers are members of a military organization with additional qualifications for which they usually are paid extra; the amount of the extra pay depends on their particular qualifications. At pres-

(Continued on Page 131)

SPORTS SUITS

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Photo By Tony Farmer

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Diver's Calendar

September 6-7 Twenty-first Annual San Diego Underwater Film Festival, sponsored by the Underwater Photographic Society of San Diego, at the San Diego Civic Theater, 202 C Street, San Diego, CA. Tickets available at the Civic Theater box office, San Diego area dive stores, Teleseat and by mail. (Contact: Underwater Photographic Society of San Diego, c/o G.C. Musser, 3943 Centraloma Dr., San Diego, CA 92107)

September 6-8 Bahamas Free Diving Championships held at the Andros Beach Hotel. (Contact: Bahamas Sports Information (800) 32-SPORT or Neal Watson's Andros Undersea Adventures (800) 327-8150; in Florida and Canada (305) 564-8633)

September 7-8 Second Annual Underwater Fun Festival at Lake of the Woods in Klamath County. Proceeds go to the Klamath County Dive Rescue team. (Contact Sergeant Burns, Klamath County Sheriff's Office, Court House, Klamath Falls, OR 97601)

September 7-8 Fifth Annual California Beach Dive Photo Competition. Sponsored by the Underwater Photographic Society of Northern California, the competition will be held in Monterey, CA. (Contact: Kathleen Rosenberg, 15750 Via Colusa, San Lorenzo, CA 94580; (415) 276-5694)

September 8 Sixth Annual Divers Swap Meet, sponsored by the Santa Ana College Dive Club. The event will be held on the Santa Ana College pool deck, 9:00 am-2:00 pm. (Contact: Jim Taylor, 22011-J Rimhurst Drive, El Toro, CA 92630)

September 27 Deadline for entries in the Ninth Irish Open Festival of Underwater Photography, to be held October 5-6 in Limerick, Ireland. Sponsored by the Limerick Sub-Aqua Club. (Contact: P.F. McCoole, Maricopa, Revington Park, Limerick, Ireland)

September 27-29 Wreck Diver Course, near Atlantic City, NJ. Offered by R. Duncan Mathewson. (Contact: Atlantic Alliance for Maritime Heritage Conservation, P.O. Box 27272, Washington, D.C. 20038; (609) 646-5090)

October 5 Diver's Day III conference on underwater education, presented by NAUI, the American Littoral Society and the University of Tampa—to be held at the University of Tampa, Florida. Evening film festival with Stan Waterman. (Contact: Ed Uditis, Box 136F, University of Tampa, Tampa, FL 33606)

October 19-26 Diving Accident and Hyperbaric Oxygen Therapy course on Grand Cayman Island. (Contact: Cindi Easterling, Box 3108, Duke University Medical Center, Durham, NC)

Film Festivals 'n Symposiums

MARINE EXPO '85

Bill Lovin will present a program of his most popular films on October 3 at 8:00 pm in Wilmington, North Carolina. The program will highlight Marine Expo '85, a week-long celebration of the ocean, sponsored by the City of Wilmington and New Hanover County.

Lovin's underwater film show will feature footage from the Bahamas, Caribbean, diving with whales and manatees, dives on the wreck of the ironclad *Monitor* and exciting diving on a sunken German U-boat in North Carolina's Graveyard of the Atlantic.

Marine Expo '85 will include exhibits, symposiums, seafood demonstrations, regattas and entertainment. For more information contact Bill Martin, Marine Resources Center, Box 130, Kure Beach, NC 28449; (919) 458-8257.

PADI PHOTO CONTEST

It is still possible to enter PADI's Seventh Annual Underwater Photo Search—but only if you have your entries to a participating PADI dive store by October 31. The competition is open to all amateur underwater photographers and you can submit as many entries as you like.

Prizes will be awarded on local, regional and international levels. Grand prize is a week-long diving vacation for two and a Nikonos V camera system from Nikon. Details on entry requirements and other contest rules are available at participating dive stores. For a list of the stores closest to you, contact PADI, 1243 East Warner Avenue, Santa Ana, California 92705.

DOUBILET/NIKON HOUSE

David and Ann Doubilet will exhibit their photographs at the Nikon House Gallery October 1-31. The exhibit of more than 50 photographs, taken at spectacular underwater vistas around the world, will be free to the public.

DACOR BC RECALL

If you purchased one of the following Dacor Seachute BCs between April 1 and May 30, 1985, your vest may be subject to a general recall. Please return your vest to the nearest Dacor dealer or to Dacor Corporation for inspection. *Do not use* this product until it has been inspected and cleared! The model numbers are: BXD-XL (6668-00), BXD-XLX (6668-01), BXD-L (6666-00), BXD-M (6664-00), BCX-LC (6645-00), BCX-L (6642-00), BCE-MU (6250-00), BCT-M (6634-00), BCT-L (6644-00).

Robotic submarines at 6,000 feet, divers at 600, job sites 100 miles off shore. The needs of the undersea industry are changing fast.

To get involved you need evolutionary training: The Professional Diving School of New York or the Underwater Vehicle Training Center in Houston.

As the training facilities for IUC, International Underwater Contractors, they stay well aware of the present and future needs of the industry. They constantly identify and define job requirements and create training programs and facilities to meet those needs.

PDSNY and UVTC student employment standings are excellent—94%* of their graduates are employed in related work.

Get the skills you need for the job you want..get the training that keeps pace... evolutionary training.

You can't afford to train with anyone else.

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City Island, New York 10464
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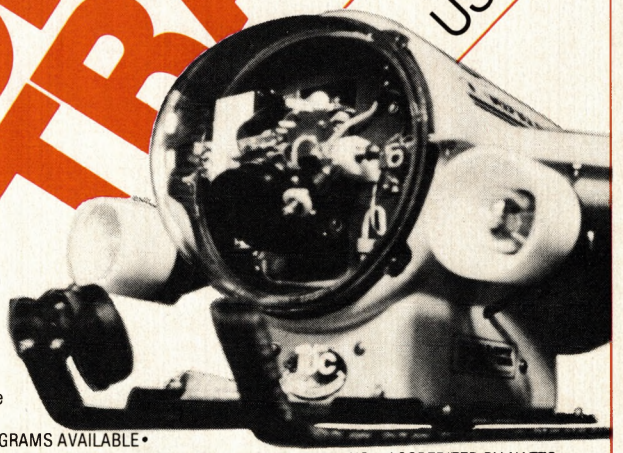
Telex: 147242

UNDERWATER VEHICLE TRAINING CENTER
10046 Chickasaw Ln,
Houston, TX 77041
Telephone:
(713) 690-0405
Telex: 4620684

1-800-USA-DIVE



*As filed with the New York State Dept. of Education
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BROWARD CO. CLUB

An independent, self-governing dive club was recently formed by Captain Sam Rich of Adventure Divers in Fort Lauderdale and Robert Good of Orbit Marine in Fort Lauderdale. The two NAUI Pro Facilities are currently enlisting members. Membership is open to all certified divers and costs $65 annually. Benefits from the sponsors include special incentives on dive trips, equipment, tuition, rentals, repairs and air fills.

The new club has been named Broward County NAUI Dive Club. Monthly meetings will be alternately held at the Fort Lauderdale High School and Plantation High School. The major project the club will undertake this year will be to sponsor the acquisition and sinking of a wreck offshore as part of Broward County's Artificial Reef Program. Club trips, projects, community services and the promotion of safe diving are the immediate goals.

Those interested in becoming members should contact Adventure Divers, 923 S.E. 20th Street, Fort Lauderdale, FL 33316, or Orbit Marine, 1683 South State Road 7, North Lauderdale, FL 33068.

FIRST AID KITS

Dive-Med, of Manchester, NH, has developed a first aid kit in cooperation with the Divers Alert Network. Available in three models—standard, deluxe and Pro-Dive-Med—the kit is suitable for use by weekend divers or professionals.

Approved by the U.S. Coast Guard and other agencies, the Dive-Med kit is watertight and will float when full or empty.

For more information, contact Dive-Med, 101 March Ave., Manchester, NH 03103.

JACOBY PHOTO COURSES

The Jacoby Underwater Photo Institute will present a series of multi-level photo courses during the remainder of 1985, with programs designed for beginning, intermediate and advanced students. Limited enrollment allows students to receive maximum attention. Instruction stimulates students to design creative shooting techniques with the use of lighting, lens selection and close-up application. Advanced courses train students to sell their work and teach underwater photography. Sessions are intensive, filled with audio/visual demonstrations, video presentations and hands-on investigation of equipment. All photo equipment is supplied for basic and intermediate courses, including video systems for the five day Florida Keys program.

Courses available are advanced/instructor, Hartford, CT, September 7-8; five day beginner/intermediate, Key Lar-

go, FL, October 13-17; creative lighting design (Fisheye Photo master class), Grand Cayman, October 27-31; and advanced/instructor course, Atlanta, GA, November 9-10. A video class is planned for the fall at the John G. Shedd Aquarium in Chicago.

Courses taught by the Jacoby U/W Photo Institute are approved and sanctioned by NAUI. For more information, contact Dick Jacoby at The Creative Whale, 940 E. Roosevelt Rd., West Chicago, IL 60185.

SEA & SEA DISTRIBUTOR

Graflex/Subsea Corp. has been named the exclusive distributor for the Sea & Sea product line of U/W cameras and lights. The new company will be known as Sea & Sea U.S.A., Inc., and will operate out of Riviera Beach, Florida.

With the establishment of a joint Subsea/Sea & Sea sales force, many dealers will be receiving firsthand directions on handling past problems and, equally as important, how to get on-line with the Subsea and Sea & Sea product lines.

For additional information consult with your local Subsea/Sea & Sea sales representative or write to Sea & Sea U.S.A., Inc., 1030 West 15 Street, Riviera Beach, FL 33404; (305) 844-8937.

BERRY SCUBA EXPANDS

Berry Scuba, in Chicago, recently purchased a new building directly next door to its current facility. The new building will house offices, the advertising department and an expanded, modern classroom. This will allow additional expansion of the direct mail and shipping departments in the original facility and expedite order processing and shipping.

PADI DIVEMASTER TEXT

PADI has introduced its new *Divemaster Manual*. Part of a succession of texts that includes the *PADI Diver*, *Advanced Diver* and *Rescue Diver*, it is the fundamental text for PADI Divemaster training.

The manual covers how to organize and conduct dives for students and certified divers. It discusses the divemaster's role as topside activity supervisor and underwater guide. It also discusses how divemastering techniques may vary depending on activity and environment. Included are such topics as how to supervise beach and surf entries and exits; supervision of boat, night, deep, drift and cold-water diving; and an in-depth discussion of no-decompression diving—including the use of diving computers.

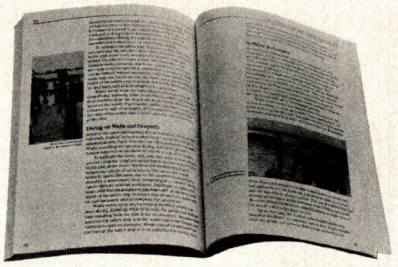
The *PADI Divemaster Manual* also serves as a reference book for instructors and assistant instructors. All divers will find it interesting reading. It is available at PADI dive stores.

It's here...

The book you've been waiting for will be the book you can't do without

The new PADI *Divemaster Manual* is more than an instructional text. Its wealth of valuable information makes it a handbook as well — one you'll want to refer to again and again. No other book tells you this much about organizing dives and supervising special activities like drift diving, or better prepares you for future roles as a certified assistant *or* an instructor.

It's easy to use and filled with more than 250 photos and illustrations.



The PADI *Divemaster Manual* is soon to be the most consulted book in your library and gear bag. And it's available now at your PADI Training Facility. For a list of stores nearest you, write PADI Training Facility List, 1243 East Warner Ave., Santa Ana, CA 92705.

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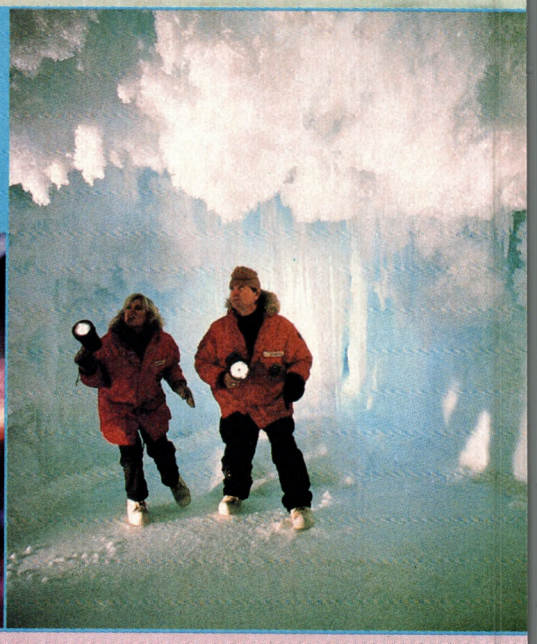
COVER STORY

OCEANQUEST NBC'S MINI-SERIES OF THE ULTIMATE HUMAN ADVENTURE

BY WALT CLAYTON

To create OceanQuest, Al Giddings (left) and his team traveled the world filming thrilling sequences of Shawn Weatherly (below) encountering the ocean's denizens. The 80 foot *Oz* (far right) served as ocean-going production center. Top: Humpback whales, Alaska. Right: Shawn and Al in an ice cave in Antarctica.



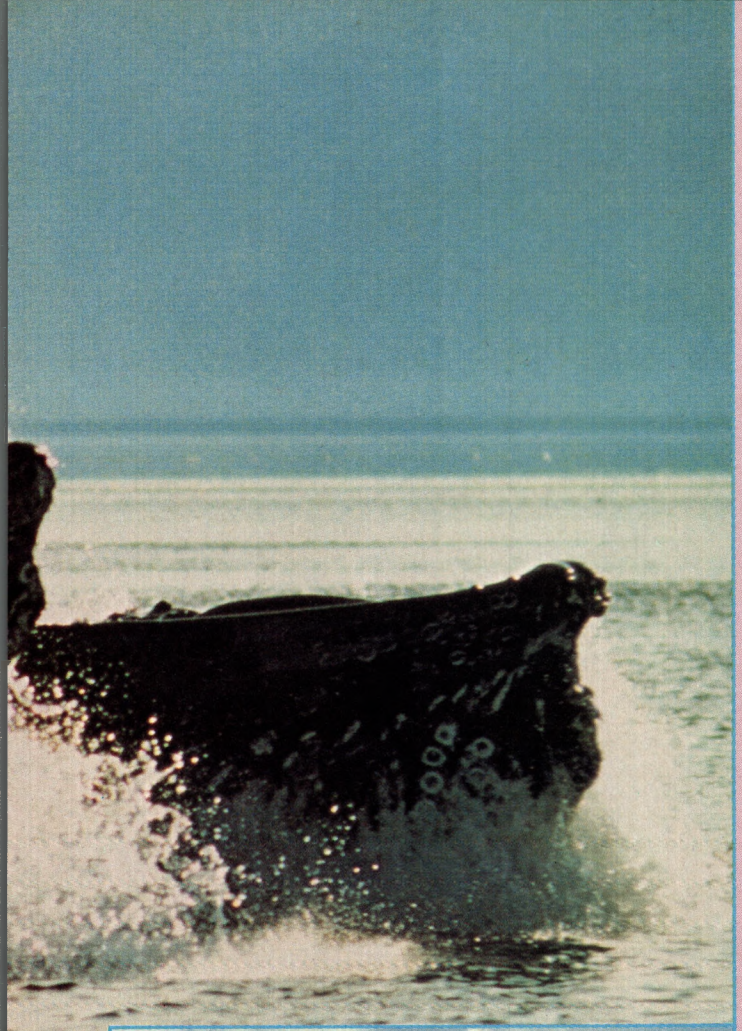
Al Giddings steadies his camera on the Japanese diver as he surfaces with his sobering find: a human skull, water draining from the eye sockets. Very gently it is placed with a growing mound of bones on the deck of the recovery boat—remains of soldiers who perished aboard the *Aikoku Maru* in the devastating Navy raid on Truk Lagoon in 1944. The divers have been at this a week, systematically removing the bones from their silty tombs.

On shore, a funeral pyre is built, draped with Japanese flags and tropical flowers. Shinto priests intone prayers while relatives of the war dead mourn openly in the sweltering heat. Finally, a torch is lit and the pyre bursts into flame—one of the most moving scenes our film team covered for OceanQuest.

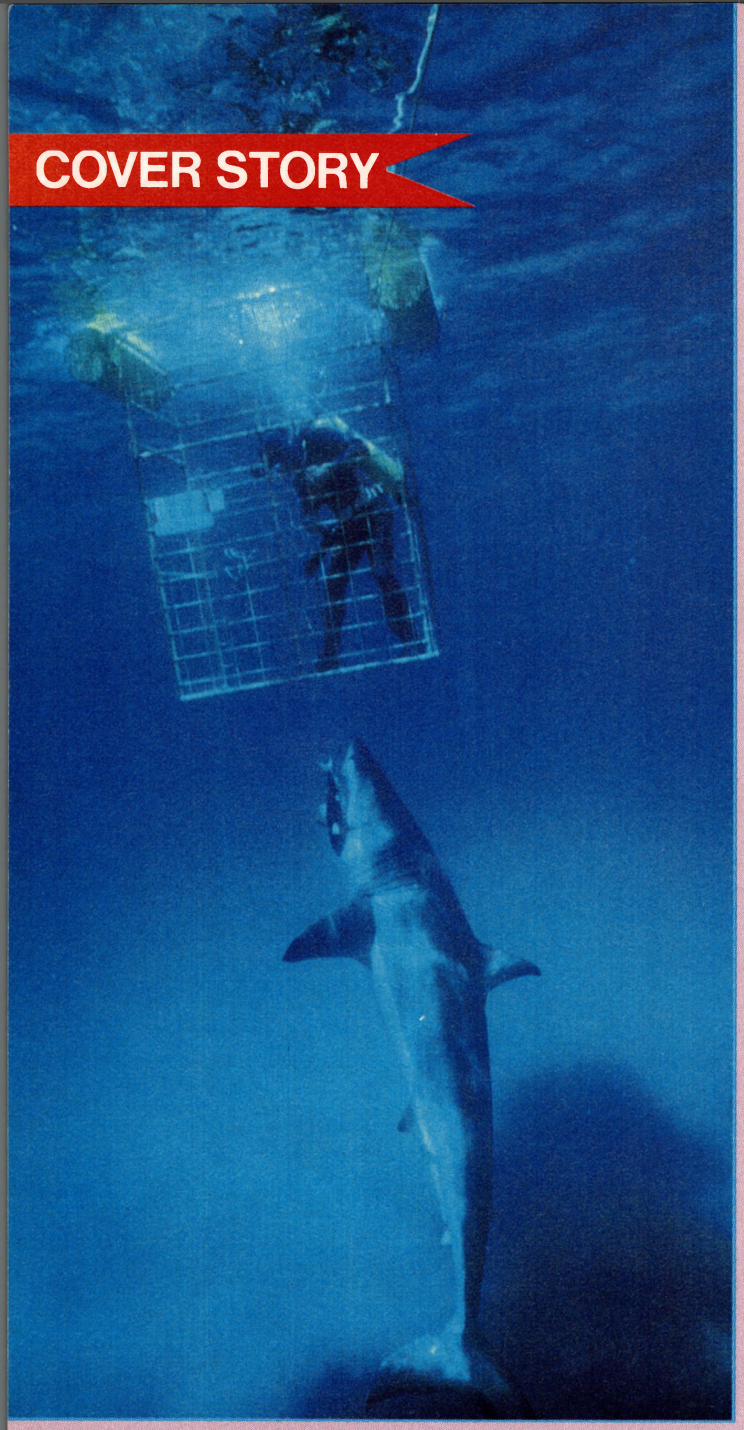
OceanQuest: The Ultimate Human Adventure is a unique NBC underwater action-adventure series that will blow your booties off. Airing on five consecutive Sundays beginning August 18, OceanQuest was produced by renowned underwater director/cinematographer Al Giddings and his Ocean Images film team. The series represents a major breakthrough in network programming, offering underwater subjects in an exciting, non-documentary format never seen before on prime time.

"For years," Al explains, "I've experienced all kinds of unbelievable things with animals in the field: whales, sharks, you name it. When it's happening, my heartbeat and emotions all run rampant and I experience a wonderful rush. Unfortunately, I'm usually compelled to share this with viewers through images of the animals alone, without a human presence reacting in-frame to the phenomena surrounding me. The idea behind OceanQuest was to put another human being—not a professional—in these open water situations on the front line with sea snakes, morays, the great whites."

Working with executive producer Peter Guber (producer of *The Deep*), it was decided to have a young woman—an unjaded, yet-to-be-awed neophyte—join our team for a year. The



Al helps Shawn close up the neck of her chain mail suit. These suits were custom designed for them by Whiting & Davis of New York. Worn over a wetsuit, the mail provided excellent protection against shark bites—even while filming 40 sharks in a feeding frenzy in the Coral Sea.



COVER STORY

search began and soon the candidate emerged: Shawn Weatherly, actress and former Miss Universe. Very athletic and an excellent swimmer, she had never dived. Through her eyes and experiences, audiences could vicariously share the thrills, wonders and fears of the underwater world.

Filming OceanQuest was the most ambitious project the Ocean Images team had ever tackled. In Al's words, "It stretched us on every front, took us to the outer limits of our experience and physical abilities. The fact that no one was seriously hurt was an Olympic achievement, considering the new elements we dealt with and what we did."

What we realized was a grueling logistical nightmare for 11 solid months. Logging over 300,000 miles by jet, turbo-prop, car, truck, ferries and charter boats, our crew of 12 sweltered and froze at some 20 locations worldwide, shooting nonstop, back-to-back. At times, we'd hit three countries in a row with barely enough turnaround to do the laundry and dry our wetsuits. The massive amount of diving and film gear ran to 130 cases, weighing in at 6,700 pounds when we were at full complement. Convincing the air carriers to move it free, or even move it at all, called for cool tempers, smooth talk and lots of free T-shirts. And, we didn't lose a piece.

But the biggest challenges came from the "new elements" Al referred to: chain mail suits, a hot air balloon and a remotely operated vehicle (ROV) nicknamed *Toto*.

Imagine a cross between a bumblebee and a space shuttle shrunk to about two feet and you've got *Toto*, a deep roving, self-propelled, surface-controlled video unit. Operator Rich Mula, in-house wizard at Ocean Images, stays topside with a video game-like control panel to manipulate *Toto* underwater and activate the camera. An umbilical cable carries the commands and an on-deck monitor displays everything the lens captures, recording rare color point-of-view shots to intercut with the other footage.

Al had never used an ROV before, but was sold on it. "It's terrific for exploration and recon. We could send *Toto* down 400 feet and not worry about the bends, water temperature or diver safety. Sometimes we'd secure it in position on a subject till the action started, which saved a lot of bottom time. We even did some rough research with the great whites, testing reactions and attack dynamics. It's a fantastic tool."

The bulk of the filming was done using the Cinema Products 16 mm GSMO, a low-profile, modular camera that is a real workhorse. Five were used interchangeably topside and underwater, with housings designed and built at Ocean Images. Dome ports were used to retain the inherent angle of the lens underwater and an estimated half million feet of film was exposed by Al, underwater cameraman Chuck Nicklin and topside cameraman Chuck Bangert, under extreme conditions

Above left: Off Australia, a great white shark sizes up a diver in a cage. Left: A humpback whale caught in a fishing net, Alaska. Above: Al and Shawn pose in chain mail suits.

with only minor glitches.

Another first was the chain mail suits, thanks to Barry Novins of Whiting & Davis in New York. Two units were custom designed for Al and Shawn and it was fortunate they had them in the Coral Sea. We were filming a shark feeding frenzy with some 40 assorted grays, whitetips and silvertips chomping into our bait clump and zipping among us. To get super close slow motion shots, Al practically shoved the GSMO into the frenzy. "I could get right in the middle of it in sort of a hand-to-hand situation that I know would have had me in the hospital without the suit. Gray reefs in attack posture will nail you. In fact, a whitetip bit me on the hand and there wasn't a mark; it just didn't get through. I see chain mail suits in future work with dangerous animals."

The most tantalizing yet frustrating piece of equipment was our specially built Raven hot air balloon. It was tantalizing because it offered a steady aerial platform for superb high angle shots of spooky animals such as whales, yet frustrating because of its finicky dependency on low winds and good weather. To make things worse, we always worked around water, which made launches from inlets tough and from small boats impossible. In Truk, we attempted a liftoff from a vintage World War II landing craft, with disastrous results. During inflation, the envelope snagged on a metal cleat and ripped out a nine foot tear. We airfreighted it stateside for repairs.

Not to be defeated, wizard-pilot Rich took Al and Shawn on a spectacular roundtrip journey over Frederick Sound in Alaska to film humpbacks, then again, filming killer whales off Vancouver Island, British Columbia. And, if the balloon blew off course? Well, we'd just tow it into position with Al's Merc-powered Mark V Zodiac.

To assist us in the field, we chartered an 80 foot motorsailer, *Oz*, to serve as an ocean-going production center. As the official vessel for OceanQuest, *Oz* proved invaluable in providing instant global communications and screening facilities to view dailies on site. Its ample compartments provided quarters for key personnel and facilities for production meetings.

OceanQuest breaks down onto five one hour shows, with something for everyone. *White Death* is first, with an attempt at capturing a great white off the Farallon Islands, offshore northern California. Then we move to Whitey's real stomping grounds, Dangerous Reef, South Australia, to conduct a series of experiments on the attack and bite dynamics of this awesome creature. In a daring first, Giddings ventures outside the cage at depth to film in the midst of five circling whites, armed only with a broomstick and his wits, no chain mail suit.

In *Men, Myths and Monsters* we de-bunk some of the myths about the sea's most feared inhabitants. In the Coral Sea, Shawn encounters her first sharks and deadly sea snakes, discovering firsthand how to cope with them and conquer her fears. She feeds giant groupers, hugs six foot morays and finds lionfish and turtles on the wreck of the *Yongala*. In the San Juan Islands she makes an entangling alliance with a giant octopus and in Baja cavorts with carrot eating sea lions.

Treasures of the Deep takes us from the stunning gold of Mel Fisher's *Atocha* in Florida to the sunken galleons that litter Samana Bay in the Dominican Republic. Here, in an unscripted stroke of fate, Shawn actually discovers an untouched galleon during the filming. In Cuba, we dive Havana harbor to recover antique bottles from the Old World fleets, and Fidel Castro pays us a rare visit to admire our camera systems and befriend *Toto*. Finally, Truk yields a treasure of a more human nature, one measured in souls, not precious metals.

Newfoundland, Alaska and the Silver Banks of the Dominican Republic dominate *Encounters of the Fourth Kind*, which traces the extraordinary migration pattern and feeding behavior of the humpback whale. Shawn tries to unravel the mystery of their songs and participates in the release of whales trapped in the nets of fishermen in Newfoundland.

The final episode, *Fight for the Bottom of the World*, takes Al and Shawn on a perilous dive under the ice in the world's most hostile environment, the Antarctic.

To pull all this together required the temperament, competence and teamwork that typifies the Ocean Images crew, the tenacity to hang in there months on end and not go crazy. But even more critical was Shawn's commitment and courage, which proved unflagging on the toughest locations and in potentially dangerous situations. Al shares this feeling: "In those areas I thought she'd have great problems, she had none. Confronting animals, diving deep into the bowels of warships, the cold water in Newfoundland, the drysuits, Antarctica—all the really super tough stuff where I'd expect trouble from the hardiest of divers—Shawn was bullet-proof."

OceanQuest, an adventure you can't miss.

OCEANQUEST DATES/TIMES

When we went to press the first of five programs in the OceanQuest series was scheduled to air on NBC on Sunday, August 18, from 8:00 to 9:00 pm, Pacific Daylight Time. The other four programs were tentatively scheduled to air on consecutive Sundays. To be sure you don't miss any part of this series, please check your local TV listings for dates, times and stations.

Photographs By:
John Barbee, Rosemary Chastney, Walt Clayton, Al Giddings, Charles Nicklin.

Left: Shawn and *Toto* face to face underwater. *Toto* is a self-propelled, remotely operated video unit. An umbilical cable carries commands to *Toto* and an on-deck monitor displays everything the lens captures. Able to dive to 400 feet, this little machine proved invaluable during the OceanQuest expedition. Below: While free diving, Al films migrating humpback whales off Santo Domingo, Dominican Republic. Below right: Al, Shawn and *Toto* aboard the motorsailer *Oz*.

Test Dive a DDL 1000 at Your Dive Shop.

Ikelite's DIGITAL DIVE LOG is the ultimate waterproof dive timer and watch. This small microcomputer automatically numbers and records each dive and surface interval. Dives and surface intervals are numbered 1 thru 99 and the last 8 are stored in the DDL 1000's memory bank for later recall. At a depth of 4-7 feet, the water pressure activates the DDL's dive time mode; the large display shows the number of the current dive and the amount of time underwater. Upon returning to the surface, the DDL's microcomputer automatically records the total bottom time in memory and then displays the number of the current surface interval and the surface interval time. The DDL's memory bank stores the last 8 dives and surface intervals allowing you to scroll back through them at any time. Should any surface interval be less than 10 minutes, the new bottom time is added to the previous bottom time as specified by the Navy Dive Tables. Underwater, the mode button can be depressed to read the time of day, use the stop watch feature, or scroll back through your previous bottom times and surface intervals.

The watch features of the DIGITAL DIVE LOG include time of day, day of week, numeric month and date, alarm and stop watch. The alarm is not very loud because of the diaphram back. The stop watch mode features start, stop, restart and reset.

The DIGITAL DIVE LOG is encased in a stainless steel housing, has a matching stainless steel band, is the size of other dive watches, and incorporates a 2 year lithium battery. It is factory sealed and guaranteed water resistant to a depth of 330' (100m).

Slip the DDL 1000 on your wrist and wear the new breed of DIGITAL DIVE LOGS.

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WATCH FEATURES

* TIME OF DAY
* DAY OF WEEK
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* ALARM
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photo/Bonnie J. Cardone

JM COUSTEAU JACKET BC

Contoured to fit comfortably, plus the ease of a built-in backpack

BY JIM WALKER

Embraced—that's how it feels to be wearing the Jean-Michel Cousteau buoyancy compensator. The shape, special features and adjustability of this jacket combine to create low profile flotation that surrounds your torso in a gentle hug.

The first secret of this design is the BC's inner bladder. Made of nylon, triple laminated with urethane, it is puncture and rot resistant. Inner baffles ensure it maintains a low, hydrodynamic profile. The jacket itself is made of tough nylon fabric for sturdy wear. It closely matches the contours of the inner bag.

The second key to the snug fit of the JM Cousteau BC is the backpack. Made of lightweight, yet sturdy plastic, it is contoured to fit comfortably. This includes flanges that extend around the kidney area. The backpack is fully enclosed in the BC—accessed, if necessary, by a non-corrodible plastic zipper. Thus, the jacket conforms closely to the backpack, further streamlining the whole system and increasing comfort.

The scuba tank is secured to the backpack/BC by a two inch wide, nylon webbing strap with non-slip rubber insert, snap-over buckle and Velcro® closure. A second webbing strap with snap-in buckle and Velcro overlap steadies the top of the tank. Attached to this is a nylon webbing carrying handle.

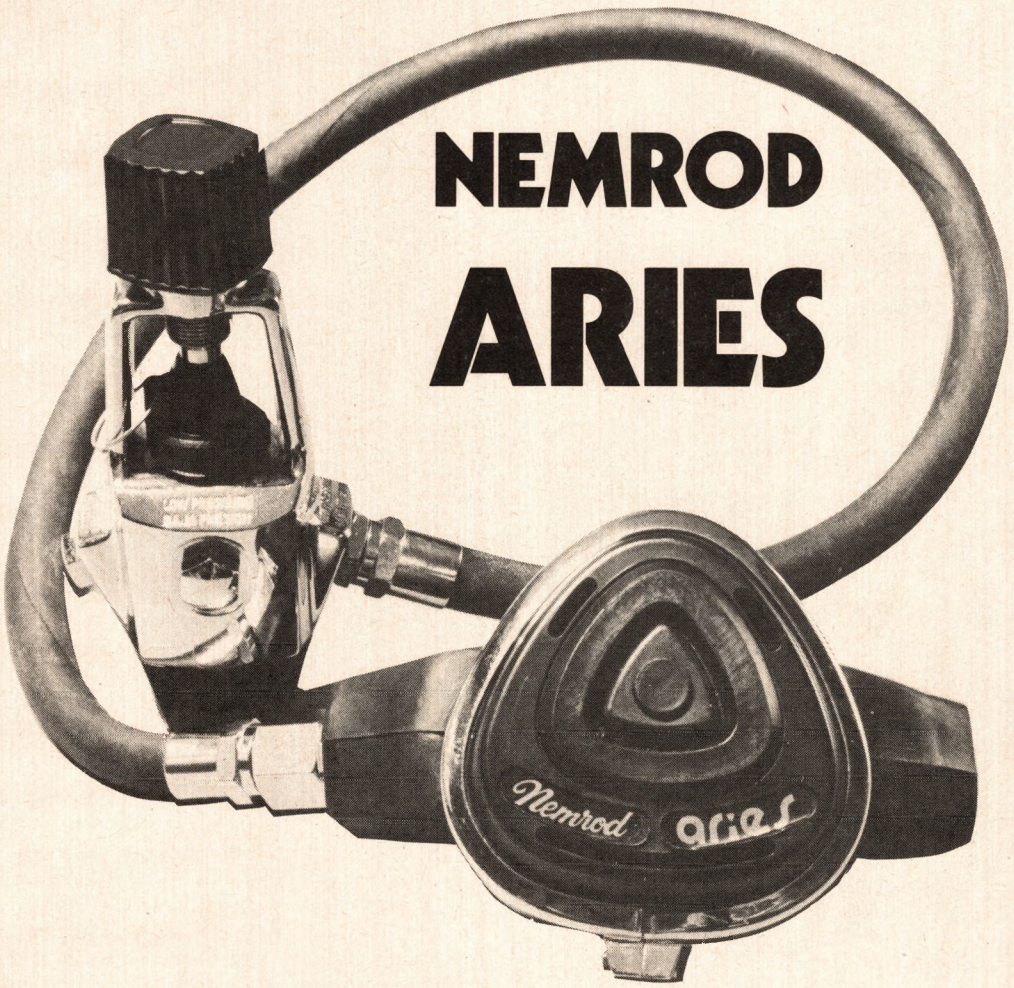
Several adjustments allow the diver to custom tailor the JMC BC to his/her body. At each side are dual webbing straps with pull-tightened plastic buckles. These adjust the front and back panels of the BC, tightening or loosening them. A single, snap-in plastic buckle/webbing strap closes the BC panels in front of the chest. The BC's nylon webbing waist strap closes with a full size plastic buckle. It weaves through the jacket alone at two points and through the jacket/backpack at an additional four points. This causes the BC to encircle the diver's waist closely and comfortably. In combination with the waist strap is a wide, soft cummerbund of nylon two neoprene that closes with a Velcro overlap. This cushions the diver's waist from the waist strap as well as spreading the weight of the system and tank around the hips for comfort.

The JMC BC features two large pockets with Velcro closing top flaps. Rather than simply having mesh drain panels at the bottom, the pockets are completely made of stretchy, porous Lycra-Spandex®. The pocket on the diver's right doubles as a slot for an extra second stage. A 25 gram CO_2 emergency inflator is under the opposite pocket. I especially liked the fact this pocket was held down by Velcro tabs and could be un-tabbed and lifted to allow easy access to the inflator.

Inflation/deflation of the BC is accomplished through a manual dump/overpressure relief valve on the right shoulder and a combination inflator/exhaust on the left. This latter is held in place with a Velcro tab and offers the choice of push-button or oral inflation as well as manual exhaust. There are three Velcro hose guides: one for the regulator second stage, one for the low pressure inflator hose and one for the SPG hose.

The JM Cousteau BC is available in small, medium or large for $434. It comes in two attractive color combinations—gray/charcoal with blue accent stripes or yellow/navy with red stripes. Let the JMC BC embrace you at your Aqua-Lung Pro Line dealer or, for dealer information, contact: U.S. Divers, 3323 West Warner Avenue, Santa Ana, California 92702; (714) 540-8010.

NEMROD ARIES



TEXT AND PHOTOGRAPHY BY ERIC HANAUER

If you are new to diving, the name Nemrod may not be familiar. But the Barcelona, Spain, based company is probably the oldest manufacturer of diving equipment in the world. Founded 50 years ago, it began making goggles and hand spears in 1939, four years before scuba as we know it was invented. In the early years of diving in the United States, Spanish regulators, fins and spearguns were a common sight.

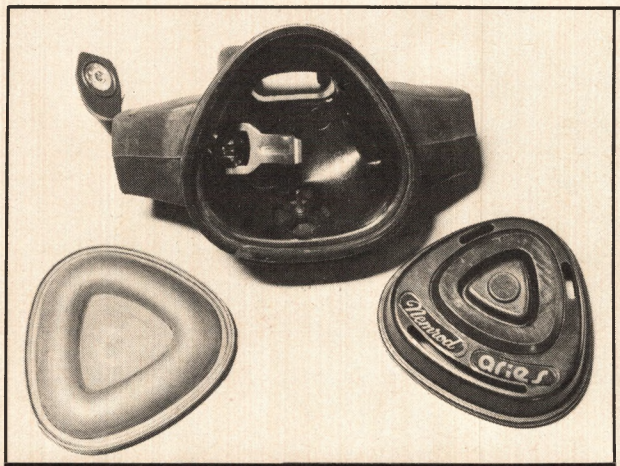
As more and more American manufacturers came upon the scene, Nemrod adopted a lower profile in this country. Today, although its sales are primarily concentrated in Europe, it exports to more than 60 countries all over the world. The company was recently taken over by Metzeler, a manufacturer of rubber products including inflatable boats. Metzeler is a subsidiary of the German conglomerate, Bayer. Yes, they are the same folks who make aspirin. With Bayer's solid financial backing, Nemrod has begun an expansion program in the American market. The U.S. and Canadian distributor is now in Edmonds, Washington.

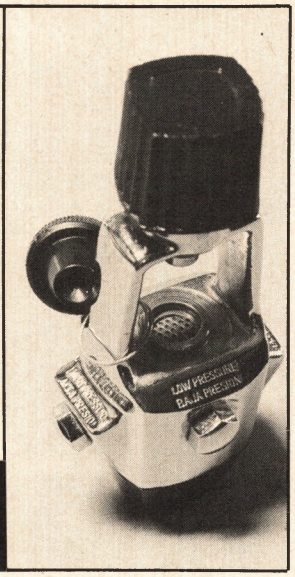
In 1945, Nemrod introduced the first regulator manufactured commercially anywhere in the world. Today the company still produces the Snark, one of the few two hose regulators still available. It also offers four single hose units. The subject of this report, the Aries, is its entry level model. Introduced in 1977, its list price of $150 makes it extremely attractive to the beginning or casual diver.

The Aries shares its first stage with the upscale Delta II, reviewed on these pages in September 1983. The body and yoke are combined in a heavy, one piece, chromed brass forging. This means it can't swivel when attached to the tank valve to custom-position the hoses coming over the diver's shoulder. Our test model had only two low pressure ports

NEMROD ARIES

Total weight	40 ounces
First stage:	
Type	Balanced diaphragm
Working pressure	3000 psi
Material	Stamped brass, chrome plated
High pressure port	One, 3/8″ thread
Freezing protection	Not available
Low pressure ports	Three, 3/8″ thread
Intermediate pressure	120 psi
Length of hose	27 inches
Swivel connection	On second stage
Second stage:	
Type	Downstream, lever action
Airflow capacity	Over 400 liters/min.
Case	Plastic body, rubber covered
	Rubber diaphragm, exhaust valves
Exhalation ports	Two
List price	$150





The Aries second stage has a mouthpiece and exhaust tee integrated in one rubber molding. The first stage has ports marked in English and Spanish.

but distributor's representative Paul Schmitz revealed that new models have three. All ports have 3/8 inch threads and are marked in English and Spanish.

Inside, the Aries stresses simplicity. The first stage is a balanced diaphragm design, with a reinforced rubber diaphragm, a Teflon high pressure seat and a stainless steel spring. Intermediate pressure is set at 120 psi. The intermediate pressure adjustment screw is easily accessible by removing the plastic end cap. Thus, emergency tuning can be done in the field with simple tools if necessary. However, this is best left to a regulator repair specialist.

Although the Aries' first stage is quite conventional, the second stage is unusual in several respects. It isn't round like most regulators; it is delta shaped. The mouthpiece, exhaust tee and second stage cover are integrated in one large rubber molding. Finally, there are two exhaust valves, one on the bottom and one on the side.

I wondered about the integrated mouthpiece and exhaust tee. What happens when the mouthpiece wears out? Paul Schmitz said that the entire rubber cover can be replaced for about $8. The cover fits over a plastic second stage housing. A neckstrap, commonly used in Europe, is attached to the cover.

Two exhaust valves are provided to enhance ease of exhalation. One is on the bottom of the second stage, the other on the left side. In our test, the major portion of air was exhausted through the side valve. The purge button isn't really a button per se, but a delta shaped rubber piece in the center of the cover. Pushing it manually depresses the triangular diaphragm, which actuates the lever-action downstream valve.

The diaphragm and both exhaust valves are rubber. That means they are more likely to be affected by ozone or other airborne contaminants. [Paul Schmitz said the rubber used is highly resistant to ozone and ultraviolet light.] However, these valves can be replaced by silicone valves during an annual overhaul. The triangular diaphragm, however, is exclusive to the Aries and must be replaced with one from Nemrod.

For our test of the Aries, we boarded the *Charisma* and headed for Catalina Island. The Nemrod was attached to the tank on a Sherwood Y-valve next to my own regulator, one of the top-rated models in the 1979 tests of the Navy Experimental Diving Unit. The purpose is not a direct comparison with a regulator that costs twice as much, instead, my regulator serves as a known standard.

First, I descended to 100 feet to evaluate performance at depth. Hard swimming and heavy breathing simulated a strenuous workload or an emergency in deep water. Although the Aries demanded more breathing effort than my own regulator, it supplied more than adequate air. There was no feeling of air starvation; the Aries couldn't be overbreathed at that depth.

Next I ascended to 60 feet and just sipped air, to evaluate minimum breathing effort. The Aries doesn't pump air into your mouth as some regulators do. Once airflow begins, you must continue inhaling to keep the air coming. But, airflow begins smoothly and easily, with no delay or mechanical feel. This is true, regardless of the diver's position.

When lying on my back, breathing effort increased. This is typical of all single hose regulators owing to the pressure differential between the lungs and the second stage diaphragm. The Aries required a bit more effort in this position than my standard regulator.

It also proved to be a dry breathing unit with no significant water leakage, even in the upside-down position. The only time it leaked at all was during a 360 degree forward roll. A few drops entered while I was on my back.

Despite two exhaust valves, the Aries is not easy to clear. Three or four breaths were required to get rid of the last few drops of water. The first exhalation purged about 80 percent of it, more than enough to allow another breath or two to finish the job. But, the diver must inhale carefully when performing this maneuver. A full, deep breath could result in some water intake.

To automatically purge the second stage, you push on the small rubber triangle in front. It takes some effort and results in a puff, rather than a blast, of air. That is enough to get rid of most of the water, but it still requires a couple of breaths to eliminate the last few drops. Clearing is easier upright than in the face down position, either when using the purge button or just blowing. In normal exhalation, most of the air is exhausted through the side valve. Plugging the bottom exhaust had little effect on exhalation effort, but when the side was blocked it became considerably harder.

Unlike high performance regulators, the Aries displayed no tendency to free-flow. When I held it with the mouthpiece up, it released a few gentle bubbles, then stopped. This characteristic could make the Aries a good choice as an octopus second stage. It is available in this configuration on special order, with a three inch longer hose.

Nemrod rates the Aries as a regulator for beginners or a second unit for advanced divers. It comes with a plastic carrying case and is covered by a lifetime guarantee on everything except rubber parts. For more information contact your dealer or Nemrod Diving Equipment, 144 Railroad Ave., Suite 215, Edmonds, WA 98020.

The Mini Strobe That Goes Where Rechargeables Fear To Tread

TEXT AND PHOTOGRAPHY BY GERI MURPHY

The SR 3000

Imagine yourself on the perfect dive vacation. You are on a dive boat in the tropics, drifting lazily over a glassy calm lagoon. Beneath the hull is a bowl of clear water and a carpet of living corals in exotic colors. Macro critters abound and the reef fish sparkle like jewels.

The dream continues. Your camera is working beautifully, for the first time in years, and you've brought along a ton of film. It could be a perfect day except for one small, but crucial problem. Your rechargeable strobe is dead as a doornail. You are stranded and flashless!

Worse yet, the dive boat is a converted fishing vessel of questionable origin and has no visible means of electrical support. The day is shot, as you have to switch to available light and those same old blue monochrome photos.

Now let's really shatter the illusion. Back at your idyllic resort there is more bad news. The entire hotel operates on some incredibly exotic foreign electrical system of 250 volts at 50 cycles. The divemaster says it can burn out your battery charger in one minute flat, turning it into something resembling a lump of coal. All hopes for colorful U/W pictures evaporate before your very eyes.

Sound familiar? It may if you have been shooting underwater pictures and traveling around the tropics for a few years. Getting your favorite rechargeable strobe juiced up can be troublesome at times. And, of course, there are a number of variations to this scenario. For instance, you forget to bring along the charger on your dive trip and nobody has one quite like yours. The strobe runs out of gas halfway through the dive day and the best macro dive is still to come. The horror stories are endless.

Does it have to be this way? Not if Sonic Research has anything to do with your choice of strobes. You can avoid all of these pitfalls by selecting the company's newest underwater flash, the SR 3000. It is a totally self-sufficient strobe that can operate on a pair of AA alkaline batteries.

In last month's issue of SKIN DIVER we reviewed Sonic Research's new, improved SR 2000 rechargeable. This model is sort of a "big brother" of the Sonic Research family of flashes. It has 10 years of proven performance. The 1985 version is greatly improved, with all new modular electronic circuitry. The unit puts out almost twice as many flashes as the old model because of a special energy saving system. It has all the bells and whistles of a big time strobe, but is the most compact U/W flash in its class.

Now, Sonic Research has introduced the SR 3000, sort of a "little brother" to the SR 2000. It has the same modular circuitry and energy saving system for long term flash performance. In fact, the SR 3000 fits into the same underwater case,

uses the same flashtube, flash reflector and switching system. Its size, weight and power output are just about identical to its big brother. The only difference is that the SR 3000 operates on dry cell batteries and requires no charging. Like most little brothers, it is very independent.

Let's take a moment to quickly review the basic specifications for the SR 3000. The little strobe is 5.5 inches long and 2.3 inches in diameter. It weighs less than 15 ounces out of the water. Each unit is pressure tested at the factory to a depth of 225 feet. It is a rugged little critter.

The SR 3000 features a flash beam angle of 70 degrees, plenty of coverage for macro photography and fish pictures. It works just fine with either the Nikonos 35 or 28 mm lens. The color temperature of the flash is approximately 6000° Kelvin, close to daylight. The power is rated at a guide number of 60 with ISO 100 film.

The SR 3000 features two different power modes—sync or slave. The unit is available with one of three types of flash cords: the Nelson SeaLoc, the Nikonos flash connector or the E.O. connector.

The back door of the strobe slides out (no screws) for quick and easy battery installation. The door is sealed with a dynamic type O-ring. It is very reliable because of the small diameter of the strobe case. A set of fresh AA alkaline batteries will produce up to 250 flashes. Recycle time is approximately eight seconds. The ready light is on the back door of the strobe. The front end is threaded to accept 55mm color filters. It will also accept the Cokin Filter System.

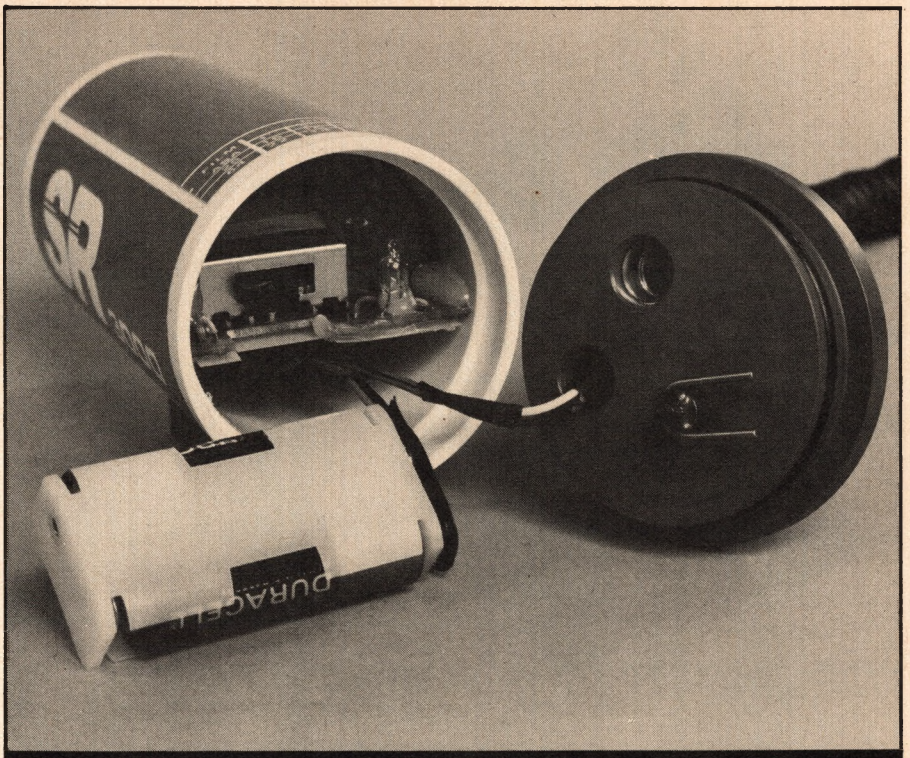
Now here is an interesting feature of the SR 3000. Suppose you want to use rechargeable ni-cad batteries instead of alkalines? No problem, the strobe circuitry will operate on either type of battery. It is very flexible.

What is the performance difference? Because of the slightly different voltage, ni-cad batteries cause the SR 3000 to recycle in half the time (four seconds), but will only produce half as many flashes (125 shots).

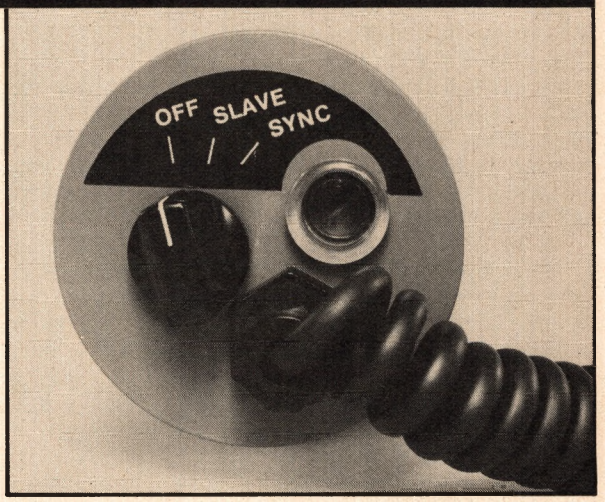
The SR 3000 is an excellent choice for the traveling diver who may be visiting undeveloped areas. It is also great for boat divers or divers who don't like the hassle of charging. The SR 3000 is also an excellent backup strobe for the diver who is already using SR 2000 strobes. All 30 Sonic Research accessories for the two strobes are interchangeable.

The price of the SR 3000 is reasonable ($250—a cordless slave model is $240) and every strobe comes with a one-year warranty. Built in San Diego, California, the strobe can usually be factory serviced in one to two days.

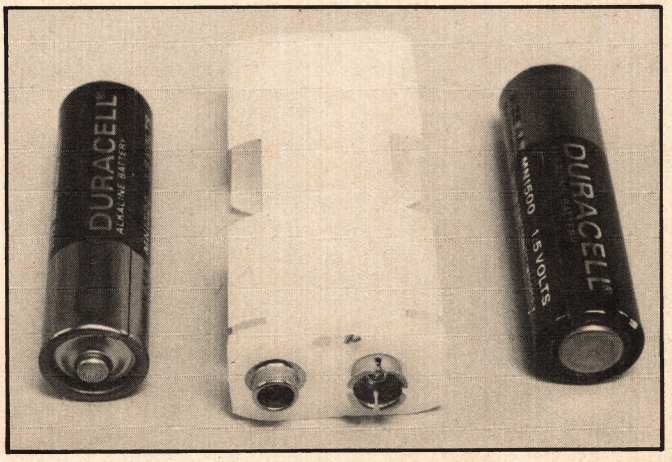
For more information and a brochure, write to: Sonic Research, 8628-A Via Mallorca Dr., La Jolla, CA 92037 or call (619) 450-9672.



The SR 3000 strobe is 5.5 inches long and 2.3 inches wide. The back door has a dynamic type O-ring seal and slides out to provide access to the interior. Each unit is pressure tested at the factory to a depth of 225 feet. The strobe is powered by two AA cells set in a snap-in module that slips under the electronics.



The strobe can operate in either sync or slave modes and the ready light is on the back door, in easy view. The coiled connector cord is available with Nikonos, Nelson SeaLoc or E.O. connectors.



Either alkaline cells or rechargeable ni-cads can be used, with the former providing more flashes and the latter offering faster recycle times.

DACOR'S HI-TECH KNIVES

Dacor Hi-Tech knives: Utility model (left), stiletto, hunter.

TEXT AND PHOTOGRAPHY BY GERI MURPHY

Have you ever started a head-down descent, then discovered your dive knife had slipped out of its leg sheath and was spiraling toward the bottom ahead of you? Oh, what a feeling!

The Dacor Corporation has remedied this problem with a clever little knife and positive locking sheath. It's called the Hi-Tech Knife and it's a honey.

The Hi-Tech series is actually a whole group of knives consisting of three different blade designs and two colors (orange or black) of handles. There are a total of six different combinations and they all fit into the same Hi-Tech sheath.

The basic knife design is nine inches long from butt to blade point and features a large, hard rubber handle for easy grip. All three knife models feature a stainless steel guard for protecting the fingers and a hole through the butt end of the handle for attaching a safety line.

All three knives have a four and one-half inch blade, but it is here the designs differ. Perhaps the most beautiful of the three blades is the perfectly symmetrical stiletto, which has a razor sharp edge on both sides, plus parallel one and one-half inch long serrations toward the hilt. This model is ideal for cutting monofilament line and opening scallops, etc.

The second model features a hunter's blade style with four inches of razor sharp edge on one side and two inches of serration on the backside. There is also a hook-type, hollow ground line cutter on the backside and a flat area for applying thumb pressure. With this knife you can saw rope, cut line, scale a fish and perform a variety of cutting functions. I would rate it as the best all-around diver's knife model.

The third blade in the series is a utility design, featuring a blunt or flat point that can be used as a screwdriver. The utility model features two and one-half inches of razor sharp cutting edge plus a small tooth serration on the same side. The backside of the blade features a large toothed serration, hollow ground on a 45 degree angle, plus a hook-type line cutter. It also has a flat area for applying thumb pressure. The knife looks like a heavy duty tool that might be helpful to wreck and commercial divers.

The blades of the Hi-Tech knives are high grade series 420 stainless steel and the tang of the blade goes completely through the handle to the butt. This is the mark of a really fine knife. In fact, Dacor thinks so much of this series that they have placed a one year warranty on every knife.

The pride and joy of Dacor's knife series lies in the sheath design. It is certainly more high-tech than most we have seen. The sheath is seven inches long from belt loop to tip and two inches wide. It appears to be made of a high impact space age plastic, which is both rugged and lightweight. The sheath is actually built of two separate halves bolted together by five aluminum screws. The back of the sheath, which fits against the diver's body, features two molded belt loops. The upper one is more than two inches wide and could fit onto a weight-belt, BC strap or other scuba harness. The lower loop is one inch wide and is specifically designed for a leg strap.

Every sheath comes with two rubberized leg straps. The upper one is 18 inches long, with a stainless steel buckle and 15 holes in the strap. The lower strap is 14½ inches long with the same style of buckle and 19 holes. Both straps are easy to manipulate and fasten to the leg. The stretchability of the straps allows for suit squeeze at depth and prevents the knife from sliding down.

The major feature of Dacor's Hi-Tech knife sheath is a stainless steel spring inside the pocket. This one-half inch wide flat spring firmly holds the blade against the backside of the sheath. Two deep grooves in the upper end of the sheath hold the hilt firmly in place and prevent the blade from accidentally slipping out of the sheath.

To remove the knife from the sheath, the diver simply pushes the handle away from the body and pulls upward. When you slide the blade back into the sheath, it automatically goes into a locking position with a loud snap.

Dacor's engineers have also incorporated a sliding lock button which positively secures the blade in the sheath and prevents its removal. The button is orange and positioned next to the hand guard. Sliding the button upward locks the knife into the sheath.

The Dacor Hi-Tech knives, including sheath, are $39.95 each. Considering the size of the knife, the variety of blade styles available and the unique locking features of the sheath, I would rate Dacor's Hi-Tech knife as one of the more innovative dive knives to come onto the market this year.

For more information, contact your authorized Dacor dive store dealer or write to: Dacor Corporation, 161 Northfield Rd., Northfield, Illinois 60093.

AQUACRAFT'S TRAPPER

A bug escape-proof game bag closure

TEXT AND PHOTOGRAPHY BY BONNIE J. CARDONE

I'll never forget the first lobster I almost caught. My buddy was the grabber, I was the bagger. With the bug firmly in-hand he approached me and I eagerly opened the bag. While the surge tumbled us about, he stuffed the lobster in the bag making a mistake common to many novices—he put the bug in head first. Then, he quickly withdrew his hand. I attempted to close the bag just as quickly. Before I could, however, the bug flipped its tail twice and shot out of the bag. A couple more flips and it had made good its escape in the eel grass. On this first-ever lobster dive neither my buddy nor I realized that bugs should always be bagged tail first. That way a flip of the tail merely means the crustacean goes farther into the bag instead of out of it.

Now, however, there is a special goodie bag closure that makes bagging bugs easier and eliminates the need to always put them in tail first. Sold by Aquacraft II and shown on this page, it is officially called the Trapper. You can buy it already installed on a bag or separately to put on any bag with a 12 inch diameter opening. Once in place, it makes the goodie bag bug-escape proof.

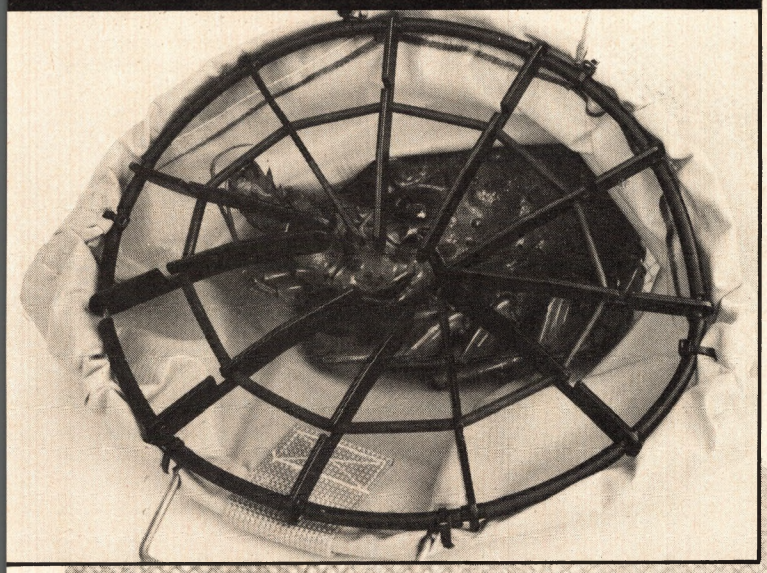
The Trapper is a 12 inch diameter stainless steel ring, covered with short lengths of black plastic tubing. It is held in place on the rim of the bag by six plastic tie-downs. Spaced evenly around the bag are 11 prongs of ABS plastic. They are attached to the ring by holes in one end and because of this they can rotate 180 degrees. (The bag keeps them from rotating 360 degrees.) Each prong has a slot in it. A six inch diameter neoprene O-ring fits into the slots in the prongs to keep them closed.

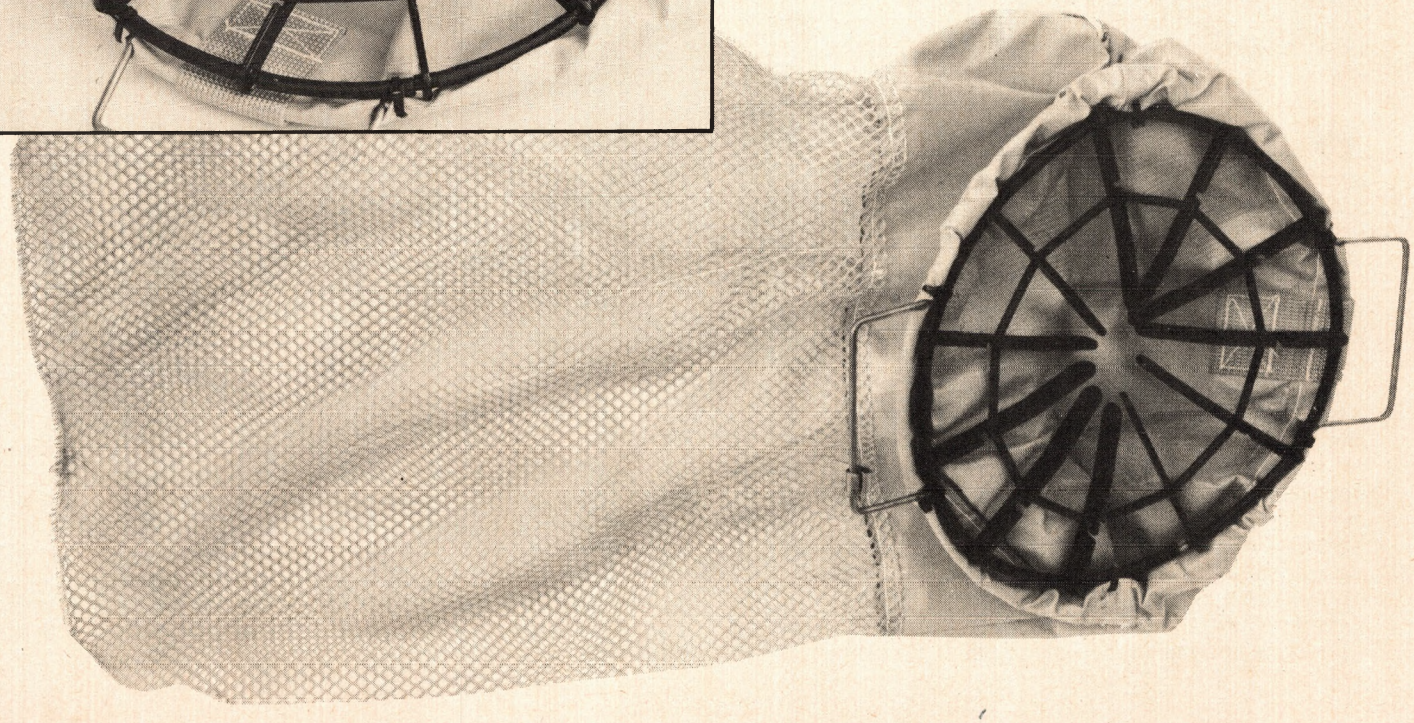
To bag your catch you merely push it through the O-ring secured prongs. When you want to de-bag your bugs, simply turn the bag upside down and give it couple of good, hard shakes.

The Trapper isn't just for lobster, you can use it to prevent any game from escaping or getting accidentally dumped from your goodie bag. It would seem especially useful for such seafood as lobster, crabs and fish.

Available from Aquacraft II, the Trapper (catalogue number A-489) alone retails for about $19.95. The Trapper and Aquacraft's A-51 polyester mesh bag (12 x 30″) sell for about $29.95. Shown in this article is the Trapper and the A-490 goodie bag (12 x 33″).This combination sells for approximately $39.95. The top part of this latter bag is armour shell nylon, the bottom is polyester mesh. The solid top allows you to slip your game into the bag easily without its getting caught in the mesh. If you can't find the Trapper in your dive store write Aquacraft II, 7992 Miramar Road, San Diego, CA 92126.

The Trapper is a 12 inch diameter stainless steel ring that is attached to the mouth of a goodie bag. Eleven plastic prongs, held in place with an O-ring, allow you to push your game inside but won't allow the game, such as lobster, to escape.

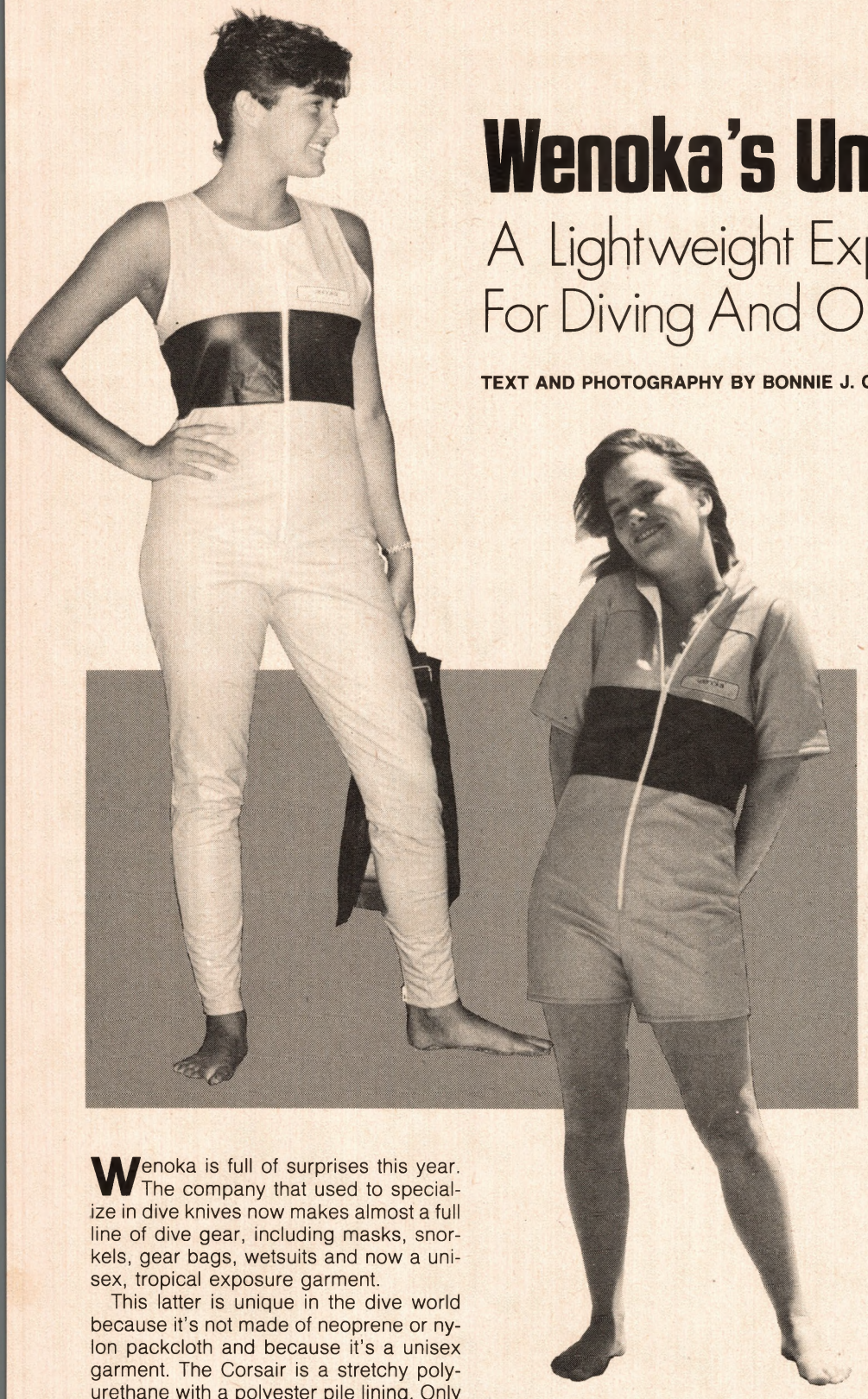




Wenoka's Unisex Corsair

A Lightweight Exposure Garment For Diving And Other Watersports

TEXT AND PHOTOGRAPHY BY BONNIE J. CARDONE



Kelly Chrisman models the sleeveless Corsair jumpsuit. Made of polyurethane with a polyester pile lining, the Corsair is light and comfortable and can be used for a variety of watersports.

Kym Gentry wears the shorty version of the Corsair. It has raglan sleeves and a wide collar. Both styles feature front zippers, while the jumpsuit has additional zippers at the back of the legs.

Wenoka is full of surprises this year. The company that used to specialize in dive knives now makes almost a full line of dive gear, including masks, snorkels, gear bags, wetsuits and now a unisex, tropical exposure garment.

This latter is unique in the dive world because it's not made of neoprene or nylon packcloth and because it's a unisex garment. The Corsair is a stretchy polyurethane with a polyester pile lining. Only 2 mm (less than one-eighth inch) thick, it is not just for diving, it can also be used for snorkeling, waterskiing, boardsailing, boogie boarding, jet skiing or surfing—almost any water sport. Topside, it functions as a windbreaker as well as providing warmth and protection from the sun. Underwater it provides warmth and protection from corals, etc. The flexible material does not restrict movement, bending and stretching with you. The terry cloth-like lining is soft and comfortable.

You could probably wear the Corsair for topside watersports in almost any locale during the summer. Snorkelers and divers will find it appropriate for use in warm, tropical waters. Unlike neoprene wetsuits and nylon packcloth drysuits, Wenoka's Corsair will not add buoyancy. This means both scuba and breath-hold divers will need to wear less weight.

One of the advantages of the Corsair is its packability. The material is thin and lightweight; the suit will fit into a much smaller space than a conventional wetsuit. It dries quickly as well. Care of the suit is easy: Rinse with freshwater after use and let dry. An occasional hand washing in a mild detergent should keep it looking like new.

Another plus of the Corsair is its unisex styling: It should fit a wide variety of body types. There are two versions. The shorty has a nylon zipper up the front; a collar to provide protection for the neck; and short, raglan sleeves. The main color is bright blue. There is a wide, bright yellow band and a navy blue band in the middle. The sleeveless Corsair jumpsuit also has a front zipper as well as a six inch zipper on the back of each leg. These latter make the legs fit snugly. The jumpsuit comes in the same colors as the shorty.

Both Corsair models appear to be well made. The edges of the sleeves and legs are turned under and stitched; seams inside the suit are overstitched.

The Corsairs come in five sizes ranging from extra small to extra large. The shorty sells for $93; the jumpsuit is $112. See them at your Wenoka dealer.

Frank Scalli

Biggest Little Diver In The World

BY HILLARY HAUSER

Frank Scalli

Frank Scalli has retired. Ask who that is and you'll get a description of this unbearably funny little guy who runs around at high speed. His particular spot in the diving industry has been secured for many reasons and one of them is that he has introduced the Cousteaus—Jacques, Jean-Michel and the late Philippe—to more diving audiences than just about anybody.

He is an outrageous person who also has a side serious enough to earn him the title of national sales manager for U.S. Divers, a position he occupied from 1969 to 1985.

Perhaps a more impressive achievement is that Scalli fed the entire diving industry a diet of Maine lobsters and Ipswich clams—as many as anybody could eat in one sitting—once a year for ten years. "Now, how does one do that," you ask, "considering that this industry involves zillions of people?"

It didn't always.

In those early days of the industry—the '50s and '60s—smaller audiences gathered in theaters around the country, watching in rapture the cinematic efforts of filmmakers such as Stan Waterman, Joe MacInnis, Dick Anderson, a Cousteau, Captain George Bond, Al Giddings, Jack McKenney and Paul Tzimoulis.

Those were the days before Hollywood discovered what could be done with cameras beneath the sea and U/W film festivals were, for a long time, the only outlet for these artists.

In those days film shows were the times diving adventures could be compared. The adventure level was at an all-time high then, because so many new things were being discovered. While underwater filmmaking hadn't quite hit the fantastic Hollywood celluloidic, big-money times, there was the excitement of dis-

Discover the treasures of Treasure Cay

Photo: Sue Kleva

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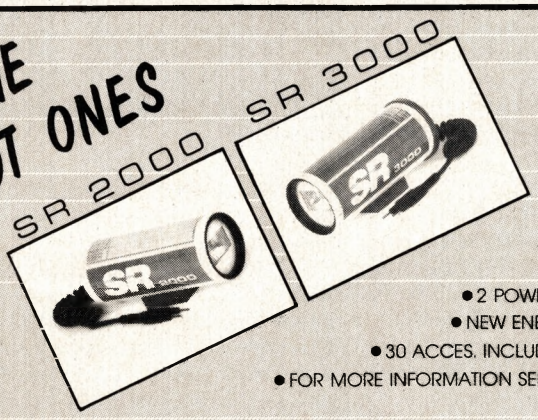

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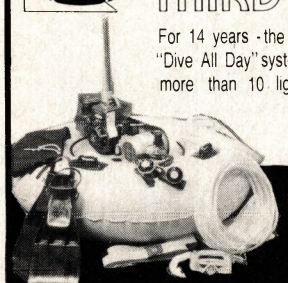

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FRANK SCALLI

covery. Equipment wrinkles were being worked out. Diving, for the most part, was this thing you did, and watched yourself do, with awe.

Scalli held lobster get-togethers at his magnificent Gloucester home in Massachusetts, following the annual Boston Sea Rovers film festival and clinic. Every year, Scalli's wife, Mary (to whom he's been wedded 34 years), and his five children participated in all of the festivities.

Scalli, the biggest little diver in the world, always ran around these eat-a-thons, and if you missed him because of his height, you never missed his humor. And, with his unmistakable East Coast accent (DEMA is "Demer," lobster is "lobstah" and so on), he was an unforgettable master of ceremonies for many a dive function.

After Scalli announced his retirement from U.S. Divers in April, he let everyone

The author and Scalli

get used to the idea, then he talked about what he was going to do next. As he talked about the future, light was shed on the past—particularly on the Boston Sea Rovers' role in the history of diving.

Scalli started diving in 1953, after he came out of the army (he was a paratrooper and never lost his ability to fall out of the sky unexpectedly). He remembers those early days of instruction as "those times you could take two lessons and learn how to scuba dive." He took his two lessons and was launched.

Four years later, Scalli was teaching scuba diving and in 1959 he went through the first national certification program (then offered by the YMCA). With this under his weightbelt, he opened a dive shop in Natick, Massachusetts, and joined the Boston Sea Rovers ("the only club around").

In 1961, he went to work for U.S. Divers as East Coast promotional director (Bill Barada covered the West Coast). In 1963, he went into sales. He became national sales manager in 1969.

The intimacy of the industry in the early days created special memories that have filled seven scrapbooks with photographs. "We worked hard, but we played hard," said Scalli. "The diving industry was my whole life, my second family."

The industry reciprocated the feeling. At one point—in 1963—Scalli was a member of the board of directors for the three major certifying agencies—YMCA, NAUI and PADI.

"No one had done that before," he reminisced. (And they haven't since.) "That was interesting, looking back at that. That's when we were all friends. Everyone was just getting started."

The Boston Sea Rovers, Scalli said, was unique—"still is a good club, probably the oldest, longest-lasting club with an annual program."

The Sea Rovers' 34th anniversary is coming up, Scalli pointed out, and those who remember these programs remember Scalli as the MC for many of them. Delivering quips and gags, he poked people in good fun and moved show after show along in his unique and unforgettable nasal style.

The lobster bashes at his house were another type of show.

"It would be the day after—Sunday—we'd buy 60-70 lobsters, clams and everyone in the diving industry used to come," Scalli recalled. "Stan, Jack, Paul, Melville Grosvenor, Edgerton, Philippe, MacInnis, Giddings—I think Al holds the record for eating four, three pound lobsters at one sitting."

Scalli recalled one of these eat-fests in which he walked down to the beach in front of his house with Philippe Cousteau, MacInnis and Giddings. The group saw divers coming out of the water. As they walked up to them, the divers proceeded to explain what they were doing, what diving was all about and why they walked backward when they wore fins.

"That's not to embarrass anybody," Scalli said. "It just shows how new we all were. They didn't recognize Philippe."

The Sea Rovers festivities on the infamous barge, during the Saturday night before the lobster fests, were legendary, too, and others heard about these floating events across the country for weeks afterward. Scalli remembered the time Captain George Bond—"in his dress whites"—was shown a door that dropped into the Boston Harbor. "There, it's that one, the third one on the right," someone told Bond. The captain opened the door, stepped out and "whammo, there he was, in the bay."

The tradition surrounding the silver bowl given annually to the Diver of the Year was another cause for trans-country talk. Whoever won this award had to drink from the bowl without touching it with his hands. Scalli thinks the bowls awarded to Giddings and MacInnis still have teeth marks in them

Today, the Diver of the Year is lowered to the bowl by the feet. "I guess we were having trouble with people's dentures," Scalli explained.

Diving for Scalli wasn't all horseplay. His highest adventures include a dive on the *Andrea Doria* in 1969—"no, maybe it was 1967, Gimbel was on it right away

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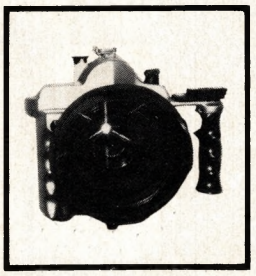

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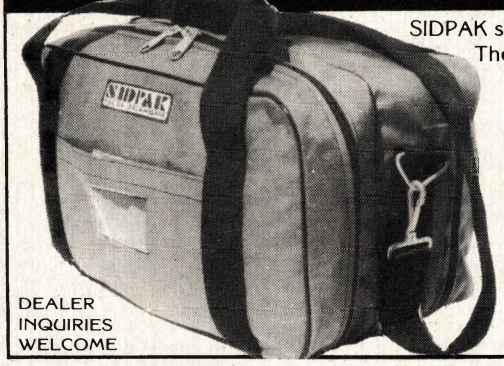

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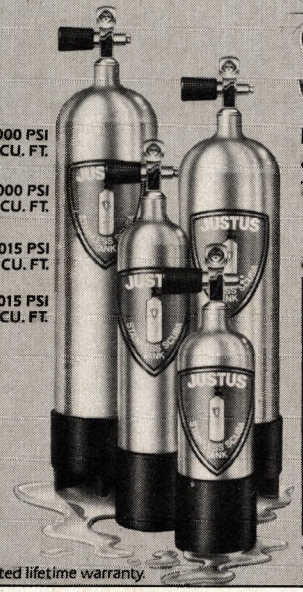

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FRANK SCALLI

and we were three years behind. We were probably one of the first sport diving groups to go out on it," Scalli recalled. "It was absolutely priceless."

Another highlight was teaching Melville Grosvenor of National Geographic how to dive—on a wreck in Lake Champlain. "He had said that after all the years of funding Cousteau and so on, no one had offered to take him underwater," Scalli said. "I took him diving and he was absolutely ecstatic. He brought up an old piece of wood from a wreck on the bottom and wouldn't let go. He was 69 years old then. That was a highlight for me—he was such a good person, had done so much to promote diving, via the magazine. It was nice to take him down and show him the bottom."

photo/Bill Leckie

Joyce Markstahler, Jan Cousteau, Scalli

The future of the diving industry, Scalli said, is continued growth.

"I see diving becoming bigger and bigger," he said. "There are a lot more people into it now. It's grown from very small to very large—all in a matter of 30 years. It's growing at a healthy, exciting rate."

The future of equipment is exciting, too, he said. "I would think some day . . . there will be a pack that gives life support and propulsion all in one. A diver will jump in the water and stay there as long as he wants—with something other than compressed air. Half of this is available now. A completely self-contained diving system—slip into it and off you go."

As for his own plans, he is going to "stay clear of the business" and is doing things he never had time for before. He and Mary visited Mt. Vernon after attending Jacques Cousteau's 75th birthday party in Washington, D.C., and he has already put a new teak deck on his boat, a 26 foot classic cruiser. This is something he has wanted to do for about 12 years.

He also plans to get in the water more—"I've started a little this year and I'm going to chase lobsters, scallops and clams." It's hard to do anything at half speed, he said, but the whole relaxing plan is working for him. He has found he likes being able to do things he wants to do any darn time he pleases, and those are his exact words.

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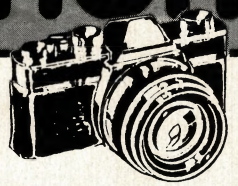

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2. No entry will be permitted that has won a Regional or Grand Prize in any previous PADI Underwater Photography/Search Competition.
3. All entries must be submitted to participating facility for local judging. Local winning entries will then be sent to PADI Headquarters for international judging. Applicants may enter as many photographs as they wish: photographs may have been taken any time with no geographic restrictions.
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7. Winners will be chosen by a point system based on technique, lighting and composition. Bonus points are awarded for exceptional effectiveness in any given category, exceptional creativity and degree of difficulty. Vertical format is preferred. Decisions by the judges shall be final.
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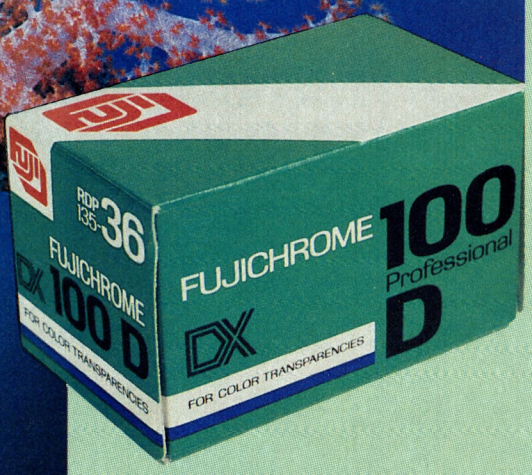
Fujichrome 100



Top: Colorful growth on the *Fujikawa Maru*—Nikonos with 15 mm lens, f8, film speed dial set for ISO 200, SB-103 strobe with diffuser, set for TTL. Above: Leather corals on the *Fujikawa*—15 mm lens set for one foot, f16, SB-103, full power (manual). Right: Cathy Church with fantailed filefish—Nikonos with 28 mm lens, f11, manual exposure, SB-103 strobe, full power with diffuser at two apparent feet.

TEXT AND PHOTOGRAPHY BY JIM AND CATHY CHURCH

If you're looking for a daylight color slide film that produces sharp images with bright, snappy colors, Fujichrome 100 D (RDP) may be for you. Designed for professional photographers, RDP is the result of several new Fuji film technologies such as the L-coupler, Latex Type Coupler, uniformly developing grains, special spectral sensitization and auto masking emulsion. This is the finest ISO 100 color slide film Fuji has ever produced.

Let's begin by explaining how the professional version, RDP, differs from the regular consumer version, Fujichrome 100 RD: (1) RDP has a different film base designed for photomechanical reproduction. RDP and other Fuji professional films are highly compatible with the scanner resolution process used in photoengraving. Thus, RDP is designed for quality reproduction in magazines, catalogs and books. (2) RDP is manufactured and released at the optimum color balance and dealers must store it refrigerated at

32°F or lower. The consumer version moves toward the optimum color balance when stored at room temperature (as is standard for all non-professional films).

Although Fuji offers ISO 50 and 400 professional films, RDP's ISO rating of 100 makes it an excellent general purpose choice for those who wish to standardize with one film speed. Once they have worked out their exposure settings and have a feeling for how RDP performs, they make fewer mistakes.

EXPOSURE/DEPTH OF FIELD

For wide angle scenics of both near and far subject areas, ISO 100 gives you a little more depth of field than a slower film. For example, in about 35 feet of clear water, an ISO 100 sunlight exposure will be about f8. A comparable ISO 50 exposure, however, would be about f5.6, which produces less depth of field. In dim conditions, where the lens can't allow enough light for a sunlight ISO 50 exposure, you might get the picture with ISO 100. With strobe fill lighting, you may be able to set the strobe for a lower power setting, which prolongs battery life.

If you are using a wide angle adapter over your Nikonos 35 mm lens, picture sharpness declines noticeably at the wider apertures. Thus, every time you can close the lens (use a higher-numbered stop) you gain sharpness. If RDP's film speed of 100 doesn't produce images sharp enough for projection, shift to Fujichrome 400 Professional D.

For fish photography with a 28, 35 or 50 mm lens, when limited depth of field is an annoying problem, ISO 100 is definitely a safer choice than ISO 50. At a strobe-to-subject distance of about three apparent feet, you can expose at about f11 with a high power strobe, f8 with a medium power strobe and f5.6 with a low power strobe. With an ISO 50 film, each of these apertures would be one stop wider (next consecutive lower-numbered full stop). In addition to the increased depth of field at medium distances, the ISO 100 exposures are closer to the middle range of f stops where the lens produces sharper images at the exact focused distance.

For sunlight exposures in bright conditions, the higher film speed may allow you to use a filter (which holds back about one stop of light). With a slower film, the filter could force you to open the lens too wide for acceptable sharpness or depth of field. For sunlight exposures in dim conditions, however, we would change our recommendation to Fujichrome Professional 400 D.

You can also use RDP for close-up and macro photography. While you may, however, prefer to use a slower, finer grain film, such as Fujichrome 50 Professional D, staying with RDP is often easier. Once you've loaded your cameras, you don't have to change film if you decide to change lenses at the last minute.

With a Nikonos and close-up lens, your basic exposure will be f22 with a medium power strobe held about 12 inches from the subject. With ISO 50 film, the aperture would be f16. This, however, is a trade-off: The f22 gives more depth of field, but f16 produces sharper images at the exact focused distance. Thus, for maximum sharpness with RDP, you may decide to set for f16 and hold the strobe about six inches farther back.

For extension tube work, especially with a 2:1 tube for the Nikonos 35 mm lens or the 1:1 tube for the 28 mm lens, strobe-to-subject distances may be too close for comfort with a slower film and medium power strobe. By being able to increase the strobe distance a few inches with RDP, you can more easily control your lighting angles.

If you try a 100 or 200 mm close focusing macro lens with your housed camera, the increased depth of field you get with RDP over slower films often makes the picture. We strongly recommend RDP.

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OUR U/W FILM TESTS

We began in Hawaii where there are hordes of little yellow fish. Cathy posed with a bright yellow wetsuit, red and yellow gloves and a pair of red SB-102 strobes with white diffusers. As soon as she released a small amount of food, the lemon butterflyfish surrounded her and Jim began shooting with a Nikonos 15 mm lens and a single SB-103 strobe with diffuser. He used TTL exposure control with the camera film speed dial set for 200 (rather than the ISO 100 actually

(Continued on Page 114)

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DIVING FOR THE STRANGE AND BIZARRE

BY HILLARY HAUSER

In the restaurant of the future, diners might order an appetizer of deep-fried gooseneck barnacle—followed by whelk salad, smoked dogfish and, for the main course, sauteed sea cucumber. Some people call it scraping the bottom of the sea barrel—evidence that there has been so much overfishing of the oceans that man is now eating "trash fish."

But Susumu "Sus" Kato, a marine scientist known in California as the "father of the sea urchin industry," says that fishing for—and eating—marine species previously considered unusable constitutes a more balanced use of the oceans. Not only that, what is trash fish to one person is a delicacy to another and some of these "under utilized" species, Kato says, are wonderful to eat.

Because of Kato, the sea urchin diving industry is now firmly established in California. In Santa Barbara, a major commercial diving port in the U.S., the sea urchin has worked its way up to the number

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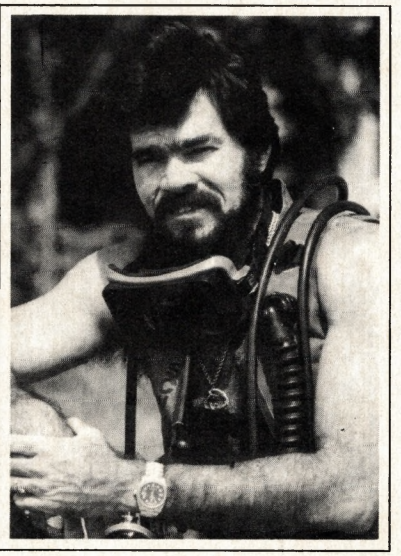

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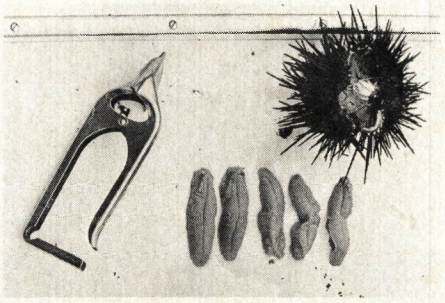
one spot on the financial list for divers. The annual harvest of urchins, in fact, has gone past abalone and lobster and way past halibut, swordfish, shark, salmon and sole.

According to figures recently released by the California Department of Fish and Game for 1983 (1984 was not yet compiled at this writing), commercial divers are bringing in about 6.6 million pounds of sea urchins for a total of $1.4 million annually. Second on the table are black abalone (344,073 pounds for $458,051) and red abalone (156,214 pounds for $377,863). Although these figures fluctuate from year to year, these numbers indicate the importance of sea urchins.

Kato, who works with the National Marine Fisheries Service in Tiburon, remembers well the beginnings of the urchin diving industry. In the late 1960s, these spiky pincushions of the sea were considered nothing more than a sea pest that fed on kelp. "Divers were smashing these sea urchins with hammers and having contests to bring them in, just to throw them away," said Kato. "Meanwhile, they were wanted in Japan, Chile, France—countries that like them. We started fooling around with them in 1968, and in 1973 we started shipping."



photo/Bob Ponce

Broken sea urchin and five lobes of roe.

Santa Barbara urchin diver Greg Hufft, who started diving urchins in 1972, said there are 80-90 divers working out of Santa Barbara and Morro Bay during the peak diving season, which begins in August with the Japanese holidays. This is a time when *uni*—the golden roe of the urchin—is served like caviar.

Kato, born in Hawaii of Japanese parents, works the Santa Barbara Channel all the time, collecting strange seafoods for which he tries to find a market in Japan. He said the average American eats 13 pounds of seafood per year, whereas in Japan the average person eats 140 pounds of fish per year.

To develop a market for a type of seafood, Kato first tastes it. (For this reason, his friends call him the "*okazu* biologist"—Japanese for good eating.) He is the only scientist within the National Marine Fisheries Service finding and developing markets for marine species previously unfished.

Other local fisheries developed by Kato include sea cucumbers and Kellett's

(Continued on Page 118)

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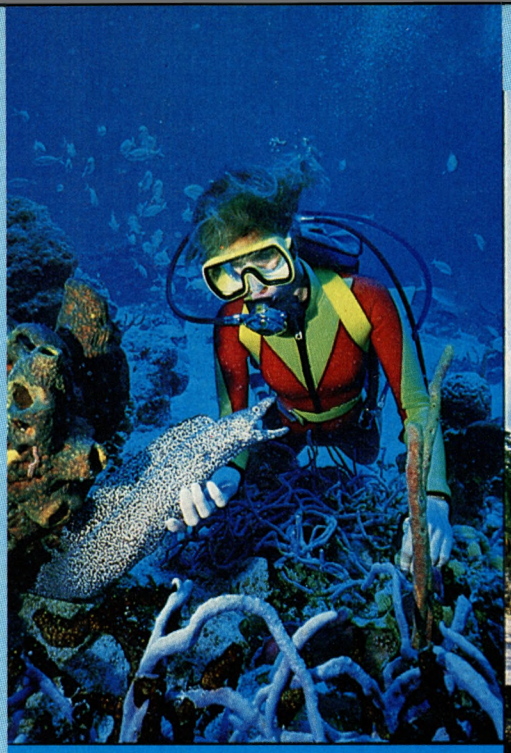
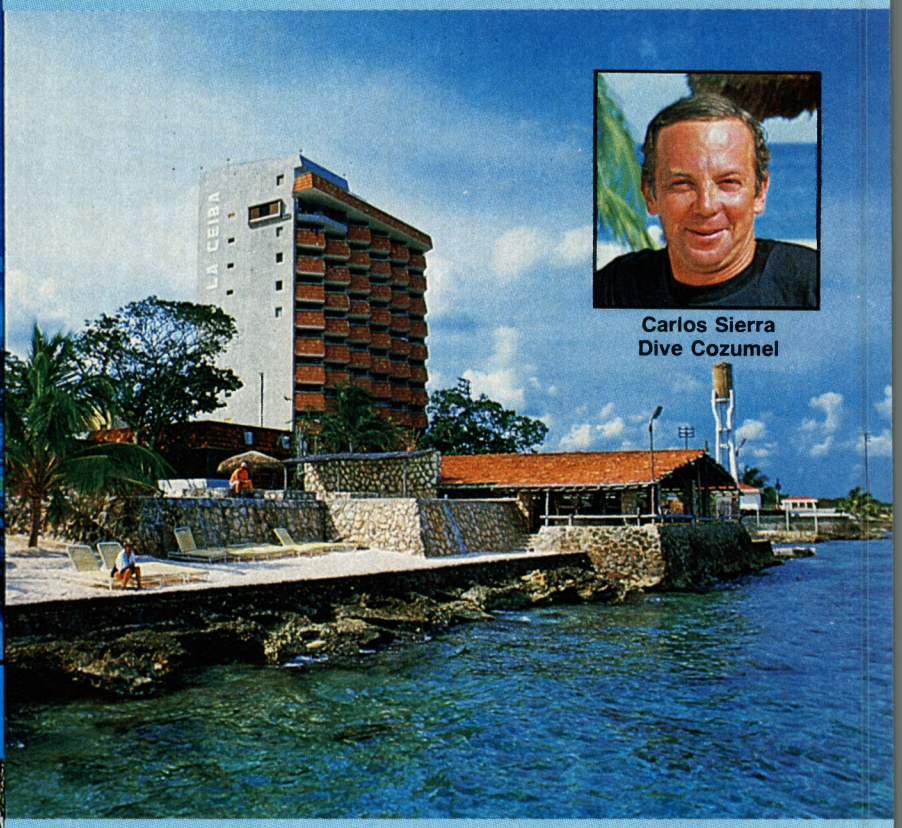


Barbara Doernbach pets a large, spotted moray eel at Paradise Reef.

La Ceiba Hotel guests relax and enjoy the tropical sunshine on the beach.

The intricately patterned, bewhiskered splendid toadfish is unique to Cozumel.

A hungry black grouper opens wide for an easy snack at Paradise Reef.



Carlos Sierra
Dive Cozumel

La Ceiba Hotel

I recently discovered what every diver in Texas must already know: There is some spectacular diving to be found off the island of Cozumel in the Mexican Caribbean. I experienced this quaint island as the guest of Don Mears of Two Worlds Travel and his Cozumel associates, Carlos Sierra of Dive Cozumel and Juan Mudespacher of La Ceiba Hotel. Collectively they comprise the three primary elements of a successful dive package: travel agent, dive operator and resort hotel. Working in close collaboration with Continental Airlines, this group has created some very attractive packages from a number of major U.S. gateway cities. They are making a very unique dive vacation opportunity available to thousands of divers every year.

Cozumel Island is a relatively large chunk of tropical splendor, 30 miles long by about 10 miles wide. It is separated from the eastern tip of the Yucatan Peninsula by a channel only 12 miles wide. The commerce of the island is primarily a by-product of tourism and occurs along a relatively small, developed strip that occupies about a third of its western shore. There are modern resort hotels, restaurants, gift shops, Mexican curio shops, car and motorbike rental agencies and, of course, dive shops, situated in and around San Miguel, the only village on the island.

La Ceiba is a luxury hotel just minutes from San Miguel, directly on the ocean with a magnificent sand beach, 113 air-conditioned rooms, a swimming pool, tennis court, color cable television, spa, sauna, two bars, two restaurants, telephones in the rooms and a dive shop on the premises. Excellent diving, snorkeling and other watersports are available only a few yards offshore. La Ceiba is a five star hotel, the highest rating awarded by the Mexican government, and is noted not only for amenities but also service.

Don Mears' involvement in the Cozumel dive scene began more than ten years ago as simply a visiting diver with a dive shop in the Houston area called Water-World Adventures. His fascination with the quality of the diving and flavor of the locale became the motivation to begin bringing

groups of divers to visit Cozumel. But, in the last four years the Cozumel connection has really blossomed for Don Mears. Ultimately it evolved into Two Worlds Travel, a fully computerized and accredited travel agency that specializes in dive travel at both the retail and wholesale levels. While other Caribbean dive resorts are served by Two Worlds Travel, Cozumel is its most popular destination for divers at present.

Price is, of course, one of the major attractions for a Cozumel dive vacation. The package tours, including air fare, from Houston and other major cities in the United States are substantially less expensive than might be found elsewhere in the Caribbean. But price alone could not account for the pervasive influence diving exercises over the local economy, nor could it account for the incredible number of divers visiting Cozumel annually. I recall doing an early morning dive at Palancar Reef, one of the most popular Cozumel dive sites, and returning early, against the boat traffic just

Cozumel's First Class Dive Operation

TEXT AND PHOTOGRAPHY BY STEPHEN FRINK

preparing for the first morning dive. We counted more than 35 dive boats with an average of 8 to 12 divers each. This was neither a weekend nor a holiday, just another day in Cozumel!

This is not meant to imply that the dive sites in Cozumel are congested just because at almost any given time there are lots of divers to be served. On the contrary, there is a tremendous area of potential sites and since many of the dives involve current and are done as drift dives, you are unlikely to see another group besides your own on many of the dives. An exception to this is with some of the more popular shallow reefs such as Paradise Reef.

The typical day of diving on the Two Worlds Travel/Dive Cozumel/La Ceiba package will begin at the hotel dock where the divers will be picked up by one of Carlos Sierra's four dive boats. The firm time of departure, boat used, dive equipment required, etc. will be determined in advance with a visit to the Dive Cozumel beach shack adjacent to La Ceiba Hotel. There is also a Dive Cozumel facility in San Miguel, but this is primarily a retail operation with T-shirts, postcards, scuba and snorkel gear.

The dive vessels tend to be seaworthy and stable diesel boats, but speed is not their primary attribute. However, they are comfortable and dry and the boat ride to the dive site becomes part of a program of relaxation. Most of the first dives are done along a massive coral reef structure that will include Palancar, Santa Rosa or Columbia Reefs and towering coral columns anchored on the edge of a sheer, vertical drop-off. Visiting Palancar once, for example, is not seeing Palancar, for the reef is tremendously large, both vertically and horizontally. It is adorned with all manner of sponges, gorgonians and marine life. There are groupers, jacks, angelfish, chubs, parrotfish, blue tangs, rays, pufferfish, turtles, hogfish and most other Caribbean species typically associated with a vibrant coral reef. There is also blue water, which usually offers more than 100 feet of visibility, and a typical current condition from moderate to strong. Each visit to Palancar will introduce new sights and experiences so even a week of diving just Palancar would remain a novelty. However, in practice, the dive guides make sure the group visits different sites each day.

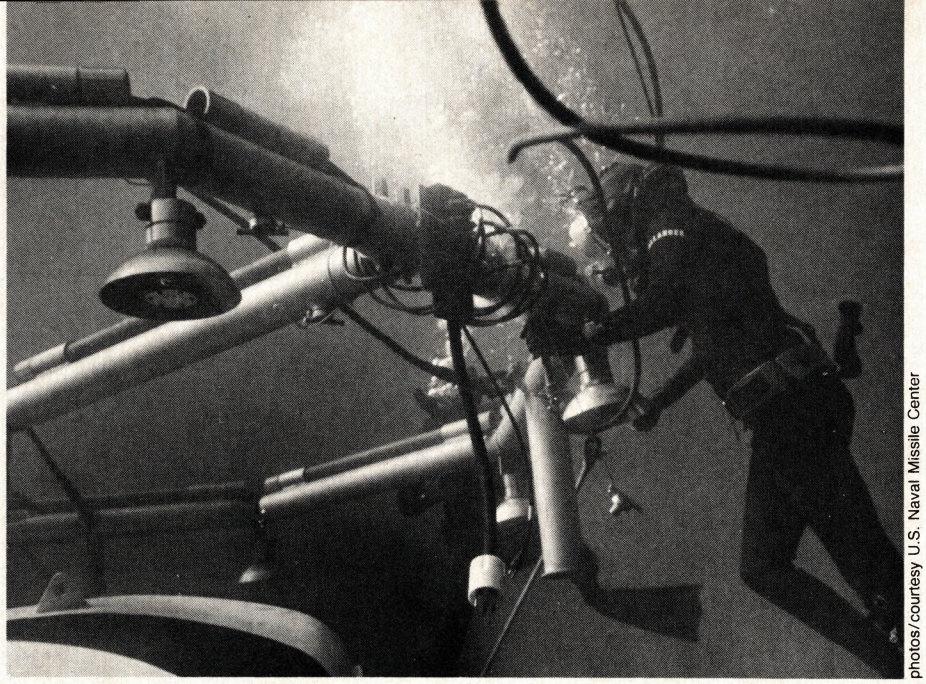
Lunch is generally taken at San Fransisco Beach and this is included in the dive package. The beach itself is beautifully picturesque with white sand and lush vegetation complementing the showers, restaurant, bars and live music that comprise the luncheon event. Most of the dive operators stop at San Fransisco Beach for lunch and recreation and to burn off nitrogen between the first and second dives. There are usually volleyball games in the sand, swimming and just lounging about to provide an additional social element to a day of diving.

Space does not permit a thorough review of the many and varied dive sites available in Cozumel, but the format is that of a deep (usually drift) dive in the morning followed by a shallow afternoon dive at a location such as Paradise (Paraiso) Reef. The coral here is fairly low profile, but the fish life is superb. There are tame groupers seeking handouts, active spotted morays, schools of queen angelfish and fascinating, splendid toadfish that I have never seen anywhere else but Cozumel. Paradise Reef is a fish photographer's phenomenon. There is plenty of light, good colors in the tube and encrusting sponges and ample bottom time. However, some days the current may be strong on Paradise and while that may keep the water clear of diver-generated backscatter, it can make it difficult to hold position long enough to take the photo.

One of the most exciting night dives on the island is just off the beach at La Ceiba at the Sunken Airplane (an old DC3 intentionally sunk as a prop for a Mexican movie production) and the surrounding corals. On a single dive it is not unusual to view sleeping parrotfish, moray eels, octopus, flying gurnards, pufferfish, splendid toadfish and squid, as well as a huge variety of macro subjects. The International Pier nearby is an equally rewarding night dive unless cruise ship traffic creates a hazard. Here vase, tube and red encrusting sheet sponges provide vibrant color backdrops for barracuda, basket starfish, orangeball anemones, sea cucumbers and moray eels. Installed in 1978, the pilings have now accumulated considerable growth and host an impressive community of marine life.

The main reefs of Cozumel constitute a marine preserve and are protected from spearfishing and coral collection. For an island economy dedicated to providing service to the traveling North American diver, this is both admirable and insightful. Healthy reefs, fine hotels like La Ceiba, dependable dive operations like Dive Cozumel and professional travel experts like Two Worlds Travel have served to make Cozumel a major component of the Caribbean dive scene.

For further information or reservations, please contact Two Worlds Travel at their toll-free number, (800) 446-2166, or in Texas at (713) 446-2166. Mail inquiries may be directed to 1307-1st St., Humble, TX 77338.



photos/courtesy U.S. Naval Missile Center

SEALAB REVISITED

A Look At Man's Shattered Attempt To Conquer Inner Space

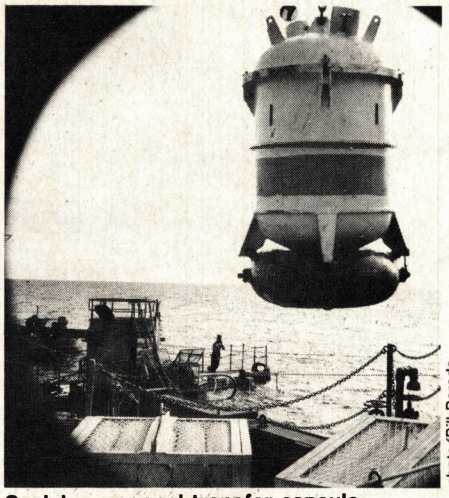
BY BILL BARADA

Sealab I was launched July 20, 1964 to demonstrate that once body tissues are saturated with special gas mixtures at a specific depth and pressure, people can live and work on the seafloor at that depth for indefinite periods with no decompression needed until the mission is completed. The success of the experiment was the first major breakthrough in deep diving since J.S. Halldane's decompression tables were adopted around the world in 1905. It was hailed as "The dawn of a whole new concept of diving," by prominent scientists. It generated high hopes for man's conquest of innerspace and his exploitation of the rich resources of the world's continental shelf, which has an average depth of 600 feet.

A Sealab reunion was held in Panama City, Florida in October of 1984 to celebrate the program's 20th anniversary. It was organized by Robert Barth who participated in the Sealab program from its inception as Project Genesis to its ending at Sealab III in 1968. Only about 60 people attended, but some of these came from as far away as Singapore. Many original participants have retired and vanished into obscurity and a number of others are now dead. But the reminiscences of the old timers at the reunion made the adventures and accomplishments of U.S. Navy aquanauts in the Sealab program as fresh as yesterday's news.

Sealab I was the first open ocean demonstration using saturation diving, but the

experiments actually began as Project Genesis at the New London Submarine Base in Connecticut. The concept was originated by the late Dr. George F. Bond, Captain, U.S. Navy Medical Corps, who experimented with animals in search of exotic gas mixtures and precise decompression formulas that would permit prolonged exposure at great depths and a return to surface pressures without harm. Dr. Bond was assisted by Captain Walter F. Mazzone and Captain Robert Workman, also with the Navy Medical Corps, who worked part time on the decompression problems. By 1962 this team had succeeded in putting animals to a simulated depth of 600 feet and bringing them back to surface pressures without harm. Saturation was achieved in 24 hours with no more gases absorbed no matter how long the animals remained under pressure.



photo/Bill Barada

Sealab personnel transfer capsule.

Requests to begin human experiments were denied, however, and Dr. Bond was advised to "Work on something of operational importance," by shortsighted Navy brass. At that time a working dive below 200 feet for more than 30 minutes was hopelessly impractical because of the decompression penalty required.

But Dr. Bond and his assistants persisted against almost hopeless odds and when the Navy became interested in helium-oxygen experiments for manned space flights, human experiments were approved by the Secretary of the Navy. As a result, three men, Bob Barth, Sanders (Tiger) Manning and John C. Bull, Jr., were put under pressure equal to 200 feet of water for two days and then brought to the surface unharmed after 27 hours of decompression.

But the entire Sealab project was constantly hampered and harassed by opposition from indifferent and incompetent Navy officials. Dr. Bond is quoted as saying, "It is because of the ultraconservative, nihilistic attitude of many people in the Navy that diving practices and capabilities made no appreciable progress during the past 25 years."

A Sealab aquanaut put it more bluntly, saying, "Aversion to new ideas is endem-

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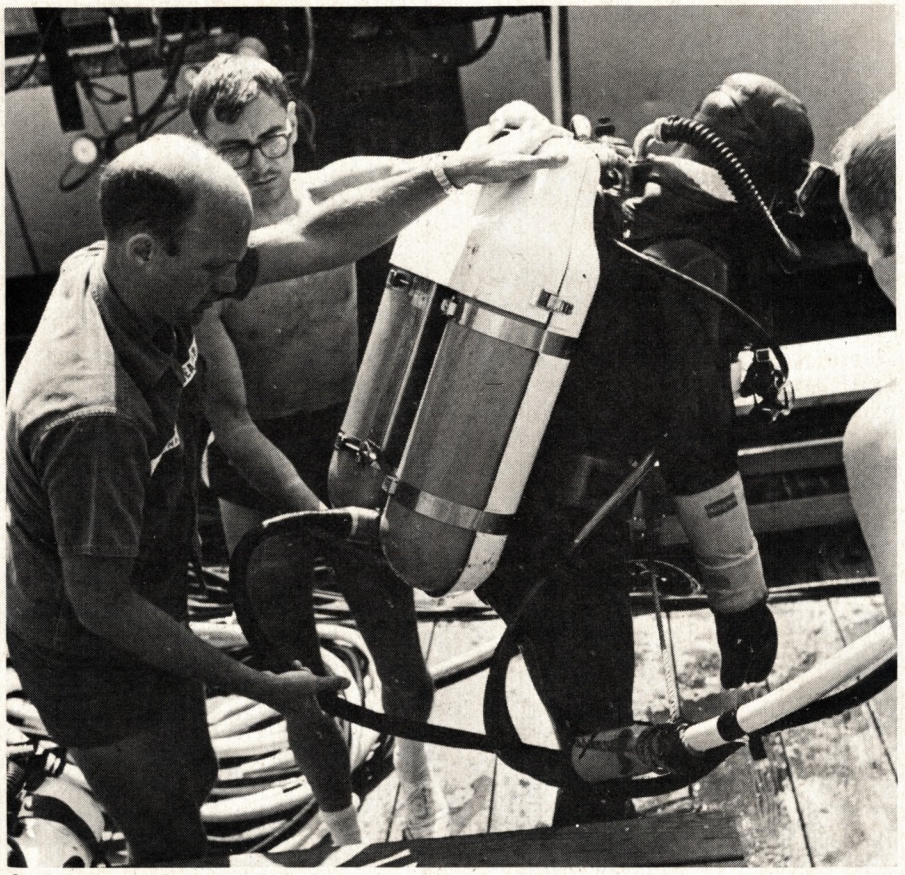

photo/courtesy U.S. Naval Missile Center

Sealab aquanaut with primary and secondary umbilicals.

SEALAB REVISITED

ic in the Navy. When Billy Mitchell demonstrated that an airplane can sink a battleship, he caught a lot of anti-airpower admirals with egg all over their faces."

At any rate, the project suffered innumerable delays, was canceled a half dozen times and was deserted by all except its dedicated crew. Many of the aquanauts say the open ocean run of Sealab I was deliberately delayed so others could capitalize on the glory of being the first to live and work on the seafloor. Thus, Navy aquanauts were forced to stand by helplessly while others made history using their hard-earned data.

Sealab I was finally launched and four men spent 11 days on the bottom in 193 feet of water off Argus Island near Bermuda. Bob Barth says the project was put together with spit and baling wire at a cost of only $148,000—compared to the multi-billions spent by NASA for a space shot. The men had to either buy or make much of their own gear and Barth says if it hadn't been for Sears, the project would never have gotten off the ground.

But despite such handicaps the project was a complete success. The men could swim in and out of the pressurized habitat at will through an open well in the bottom and in the warm clear waters they could see their support vessel floating on the surface 200 feet above them. But attempting to make that swim meant certain death because returning to the surface required two full days of decompression.

Sealab I was followed by Sealab II in August and September of 1965. Three ten man teams of Navy and civilian divers spent 15 days each at a depth of 205 feet off La Jolla, California. Although the divers had to contend with crude, complex equipment in a hostile environment, the experiment cost a mere $1,400,000 and was a complete success, owing entirely to the competence of experienced deep diving personnel who were in command.

Sealab III in 1968 was an entirely different story. It was funded by $10 million and supported by massive publicity, but ended in tragedy. Five eight man teams were scheduled to spend 15 days each at a depth of 600 feet off San Clemente Island, California. The Navy bureaucracy took charge, decisions and procedures were dictated by Washington brass and experienced Sealab personnel were ignored. The result was a long series of failures that ended in disaster.

A few examples are: Surface operators made parts out of the wrong materials, made misfit parts, designed bad seals for fittings (helium penetrates materials seven times more than air), put hull penetrations above the bilge level which caused a plague of leaks and removed a helium block which caused everything in the 1,000 foot long umbilical to be flooded.

Bob Barth and Barry L. Cannon were two of the first three aquanauts sent to the bottom to set up housekeeping. During

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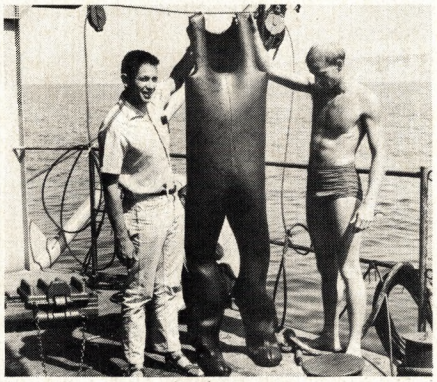
the swim from the transfer capsule to the habitat, Barth says that Cannon went into convulsions. Barth and his companion, in black, cold water, managed to get Cannon back to the capsule but he was already dead. His baralyme (CO_2 scrubber) canister on a closed circuit breathing unit had been left empty and Cannon died from CO_2 poisoning.

Cannon's death was an excuse to abort the entire program. The project was mothballed, equipment and materials were stripped and nothing remained of the $10 million Man in the Sea program except a rusting steel hull. The high hopes and expectations of U.S. Navy aquanauts for a successful conquest of innerspace went down the drain and Dr. George Bond's vision for the exploitation



photo/Bill Barada

Helium penetrates wetsuits at depth, expanding on ascent and stretching them.

of resources on the world's continental shelf was shattered.

His vision was for a nuclear research submarine equipped for saturation diving and modular, replaceable habitats for different disciplines such as geology and biology. The system could go anywhere and sit on the continental shelf while scientists locked out, then decompressed on the way home.

The Sealab series, on a shoestring budget, demonstrated that men can live and do useful work at depth equal to the world's continental shelf whenever government and industry are ready to provide the necessary tools and equipment. But what is needed is a multi-billion dollar program for innerspace comparable to that for outer space. The Apollo moon shot took ten years and cost $33 billion. The entire Sealab program cost $11.5 million, nearly 3,000 times less money.

The experience and expertise of Sealab personnel were not entirely wasted, however. The majority of those left the Navy and joined private, commercial diving companies in positions that ranged all the way from divers to company president and their talents put to use in operations throughout the world. But their expertise, along with older participants who have either died or retired, has been lost to the U.S. Navy forever.

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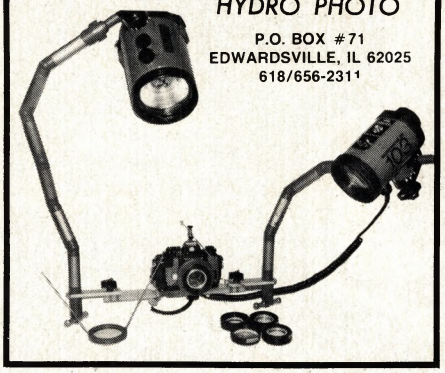

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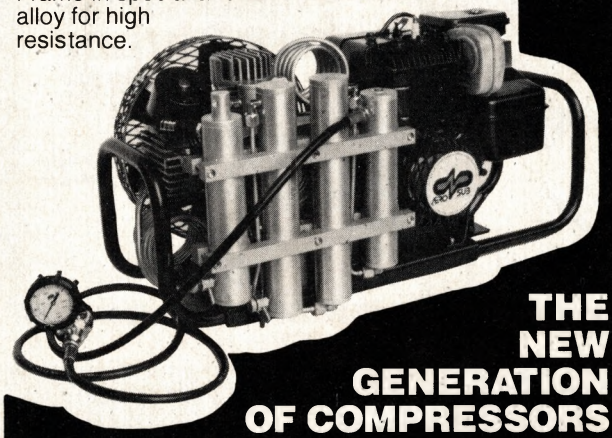

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Recently, a dive store in Louisiana reported the rupture of a disposable Lif-O-Gen oxygen cylinder. Fortunately, no one was injured. The cylinder has undergone extensive analysis at McDonnell Douglas in St. Louis in an effort to determine the cause of the rupture. Although corrosion was present, there are strong indications that the disposable cylinder had been refilled, which is both illegal and unsafe.

If you own a disposable Lif-O-Gen oxygen cylinder please inspect it for any signs of external corrosion. If corrosion is present, bleed off the contents using the regulator. The cylinder should then be disposed of properly.

For more information contact Midwest Life Support Systems, 9832 Manchester Road, St. Louis, MO 63119.

NAUI COLLEGE COURSES

Because of recent changes in standards at the National Association of Underwater Instructors, NAUI College will be offering new courses to meet the changing needs of advanced divers. A new one week divemaster program has been developed as well as new one and two week instructor training courses. Each of these will be offered once a month.

NAUI College is in its seventh year in the Southern California area. For further information on course offerings and prerequisites, contact the school's offices at 2400 West Coast Highway, Suite M, Newport Beach, CA 92663.

ROSS/TEKNA

Stan Ross has accepted the position of regional sales manager with Tekna Scuba Group and is responsible for the south, central and mid-eastern states. For information contact Tekna, P.O. Box 849, Belmont, CA 94002.

SHELL EVENTS

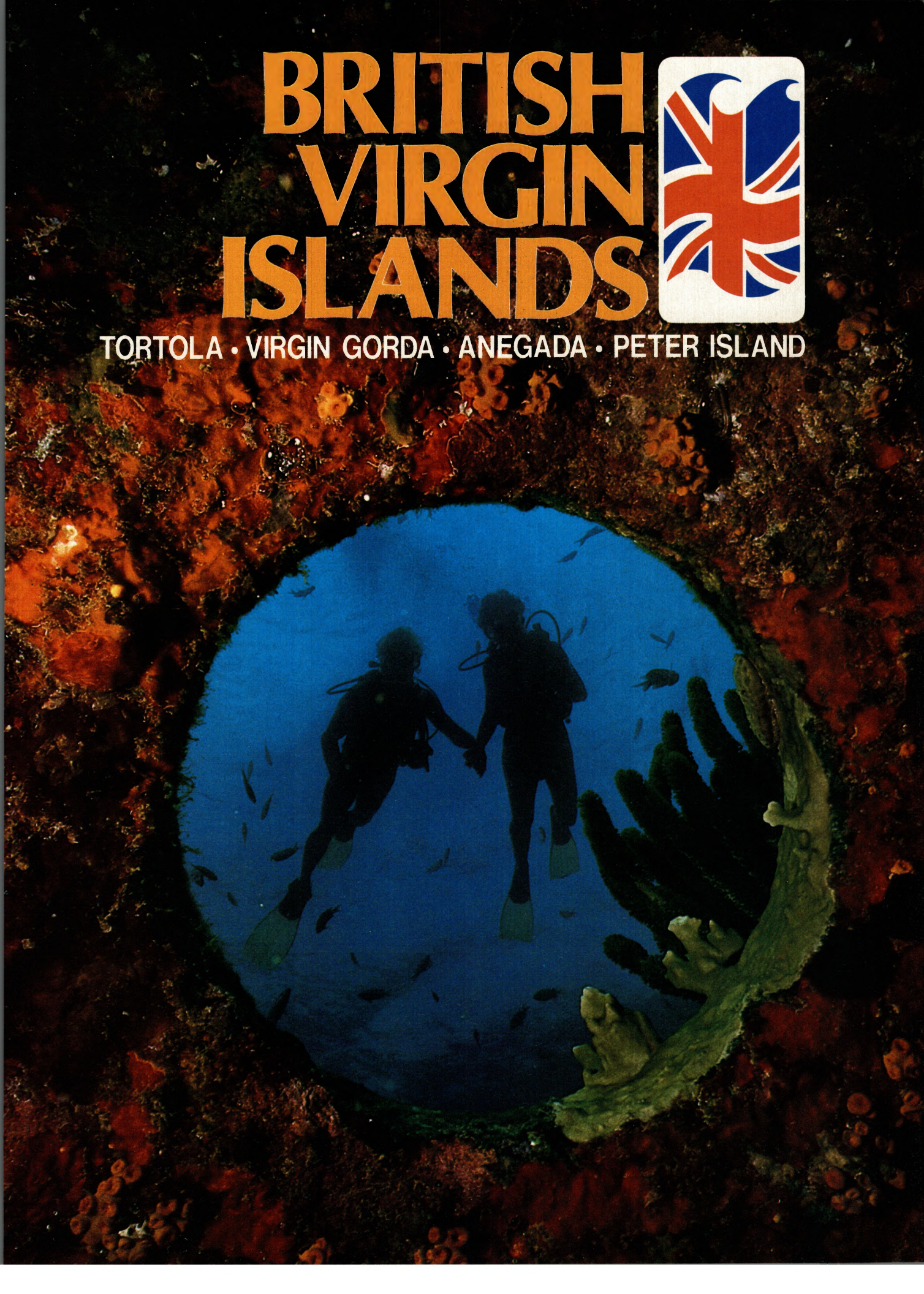
The Greater Miami Shell Club, Inc., is sponsoring two shell events. The first, October 23, will be a shell auction in the auditorium of the Rosentiel School of Marine and Atmospheric Science—adjacent to the Miami Seaquarium. The auction begins at 7:00 pm but the auditorium will be open earlier for inspection of shells and related items.

The Annual Shell Show will take place January 23-26 in the lobby of the Planet Ocean and will feature shell exhibits from around the world. The show features a special award presented by the International Oceanographic Foundation.

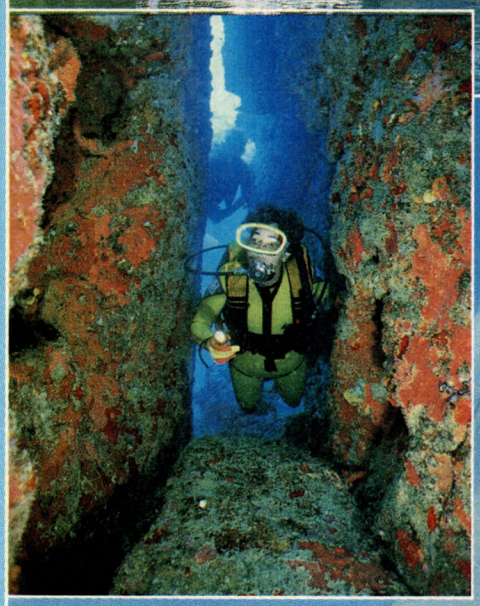
For information contact Sandra Gayle Motes, 4525 W. 20th Ave., C524, Hialeah, FL 33012.

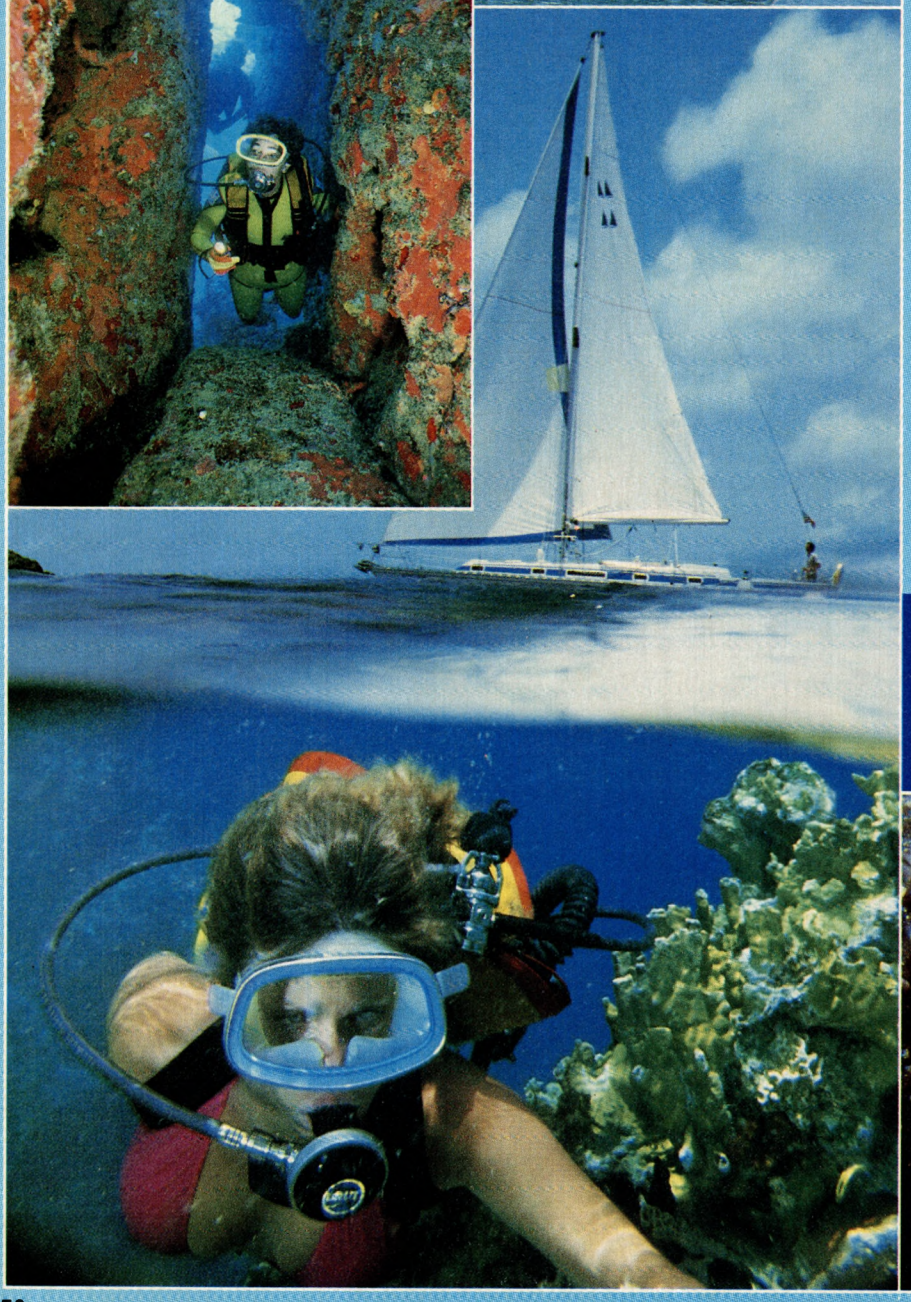
BRITISH VIRGIN ISLANDS

TORTOLA • VIRGIN GORDA • ANEGADA • PETER ISLAND



BRITISH VIRGIN





Four feet of beautifully sculptured muscle, scales and fins—hovering just a few feet away—became visible as my eyes adjusted to the dim interior of the wreck. My heart beat faster as our eyes locked. Then, as if my presence were beneath his notice, he slowly swam through the school of grunts that filled the sunken hull's interior. They parted ranks as he passed through and closed ranks after he was gone.

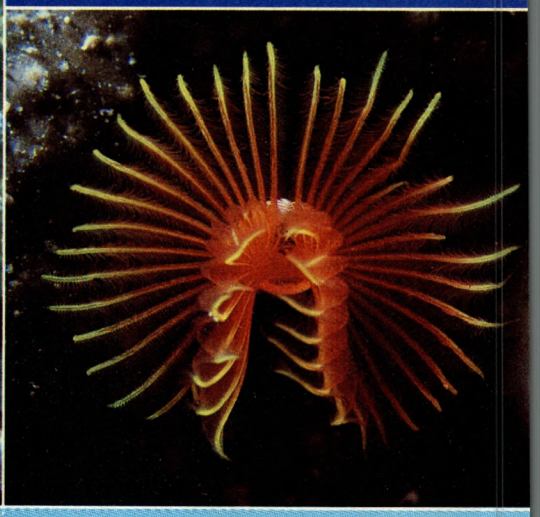
This was Jim's introduction to Fang, the resident barracuda of the wreck of the *Rhone*. Gentle and stately, Fang and Son of Fang have posed for countless underwater photographers and thrilled divers with their presence.

Chosen as the U/W setting for the movie, *The Deep*, the *Rhone* is a world famous dive site that attracts hundreds of divers to the BVI (British Virgin Islands) each year. But magnificent as she is, the *Rhone* is only one of the many beautiful attractions that await you in the BVI. It isn't a matter of whether you should come to this great diving world, it is a matter of choosing which of the many different styles of diving is best for you.

THE ISLANDS

The BVI is a necklace of small islands clustered around the historic Sir Francis Drake Channel, about 60 miles east of Puerto Rico. Volcanic in origin, the BVI feature rugged mountain peaks rising from the blue Caribbean Sea, a wide variety of vegetation because of differences

Counterclockwise from top: Aquatic Centres complex, Tortola. Divers explore a large cleft at the Chimney. With a sailboat floating serenely above, Cindy Willey observes coral in shallow water. The yellow tipped tentacles of a plumeworm.



ISLANDS An Endless Chain Of Diving Adventures

TEXT AND PHOTOGRAPHY BY JIM AND CATHY CHURCH

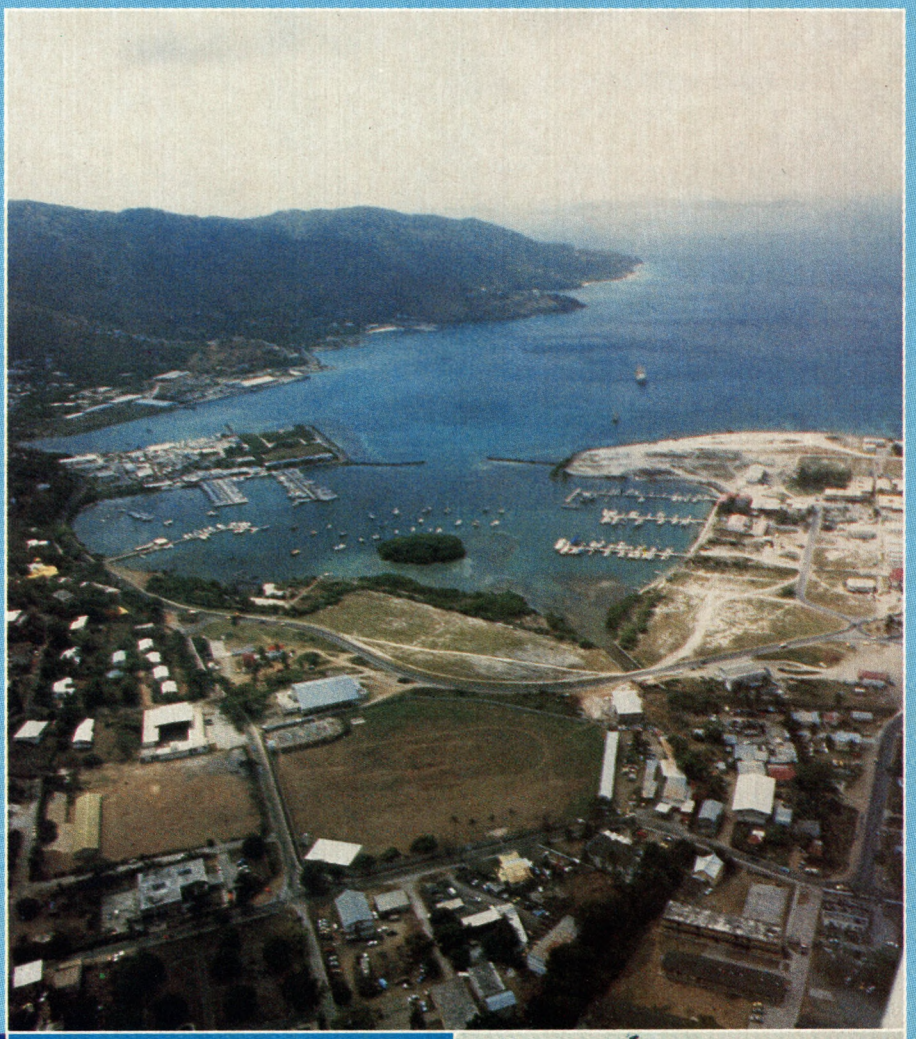
in rainfall and soil and dozens of secluded white sand beaches. The influence is British, the pace is slow and the islands are virtually crime-free.

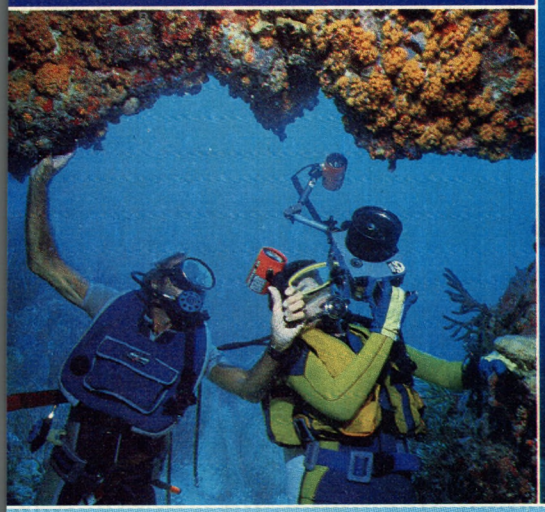
The balmy, subtropical climate is almost perfect, with temperatures ranging from about 77 to 85°F throughout the year. Evening temperatures are about 10 degrees cooler. Water temperatures vary from about 76 to 80°F in winter and from 80 to 84°F in summer. Visibility varies from about 50 to 100 feet or more.

Tortola, the largest BVI, is 12 miles long, three miles wide and has a population of less than 10,000. To fully appreciate Tortola's natural beauty, take a drive to Sky World. There, on a clear day, you can see virtually all of the Virgin Islands in every direction—from St. Thomas to Ginger Island and even to Anegada.

Road Town, on Tortola's southern shore, is the capital of the BVI. The pleasant rural atmosphere influences the town itself as cows and goats graze along the roadside. The architecture shows no pattern—modern buildings of every style are interspersed randomly among the traditional Caribbean construction. Several shops feature imported items, as well as local handicrafts such as carvings, baskets and jewelry.

Virgin Gorda is the second largest BVI. Although the people of this island live in a rural, almost isolated community, we were impressed with their sophisticated, efficient and friendly service. They make you feel welcome and pampered.





Clockwise from above: An aerial view of Road Town Harbour. A colorful BVI sailboat. The *Chicuzen*, northeast of Tortola, is a recent wreck and is in excellent condition. Bert Kilbride and Cathy Church explore an overhang at Bronco Billy's Ridge.

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BVI

The northern half of this 15 square mile island is dominated by a 1,370 foot mountain peak; the southern half is flat and dry, marked by giant boulders and edged with beaches.

Anegada, in contrast to her volcanic sister islands, is a flat coral island with a maximum elevation of 28 feet. If you just want to get away from it all and stroll more than 23 miles of isolated sand beaches, Anegada is the place to go. The 12 room ANEGADA REEFS HOTEL, owned by Lowell Wheatly, is the only accommodation on the island. The hotel has a small dive operation and boats. Check the BVI Tourist Guide for flights from Beef Island, Tortola, to Anegada.

GETTING TO THE BVI

If you are flying in from the U.S., you can fly to San Juan, Puerto Rico or St. Thomas and take a connecting flight to Beef Island Airport (a short taxi ride to most Tortola hotels) or Virgin Gorda. If you have a lot of baggage, connections with the small airlines through San Juan can be a problem because bags sometimes follow a day later. Carry a day's essentials with you and make sure that all bags are locked, including scuba bags.

If you have a lot of baggage, fly directly to St. Thomas, USVI, on a major carrier such as Eastern Airlines. Then, take a short taxi ride from the airport to the Tortola Ferry Dock and a water ferry to Tortola or Virgin Gorda. *Speedy's Fantasy* for example, connects St. Thomas to Tortola and Virgin Gorda. *Speedy's* is air-conditioned, comfortable and is like being on a big bus. There's plenty of space for baggage. Its dependable schedule (virtually unchanged for years) is in the BVI Tourist Guide (see the last paragraph of this article).

If you are traveling with a group of four, six or ten and have a lot of baggage, try this: Fly directly to St. Croix in the U.S. Virgin Islands. Braniff, for example, has an inexpensive direct flight from Dallas. From St. Croix, your group takes a private charter flight (scheduled to your needs) with Bohlke International Airways for a flight to the BVI airport of your choice. Specify you are divers when you book your charter and they will make sure the plane is large enough for your gear. This eliminates scheduling problems and delayed baggage problems with connecting flights. You can arrange a fly/dive/hotel package, for any length of stay, with Bohlke. They package with Treasure Isle Hotel and Aquatic Centres on Tortola, Anegada Reefs Hotel on Anegada and Fischer's Cove Beach Hotel and Dive BVI on Virgin Gorda.

LAND BASED DIVING

If you wish to combine the amenities of a resort with daily diving, a land based dive operation is your best choice. All of the operators discussed in this article are professionals with retail shops, tanks and dive equipment, compressors and dive boats. They can offer safe scuba instruction and know the best BVI dive sites.

AQUATIC CENTRES, based on Tortola, has dive shops at both Prospect Reef Resort Marina and the Treasure Isle Hotel jetty. Owners George and Luana Marler have authored several articles and books, including *The Royal Mail Steamer Rhone* and are currently writing a book on the shipwrecks of the Virgin Islands. George is an accomplished U/W photographer and Luana is an attractive model who has appeared in TV commercials.

Aquatic Centres has daily boat dives, with the rides to the sites averaging about 20 minutes. Divers can make three dives a day. The boats leave (from Prospect Reef Resort Marina and the Treasure Isle Hotel jetty) at 8:30 am for a two tank dive and 2:00 pm for a one tank dive. The 27 foot *Apache* carries up to ten divers and the 35 foot *Tejas II* usually carries 12, but can take larger groups upon request. Dive guide Randy Keil, a published U/W photographer, knows the local reef critters. Aquatic Centres can dive as close as sites off Tortola (two minutes away), but usually dives sites from Norman to Ginger Islands. Computerized reservations for diving, hotel and airline can be made with Claire Rowe at the J. W. Pepper Company's stateside office. If you dive with Aquatic Centres, we suggest staying at either Prospect Reef Resort or Treasure Isle Hotel. The larger PROSPECT REEF RESORT has 131 rooms. You can select studio, villa or townhouse accommodations. On-site services include a conference center, a small shopping arcade, two restaurants, a kiddie pool, a diving pool, a junior olympic pool, a sea pool, tennis, golf, a marina with sailboat rentals and live entertainment and dancing in the evenings in season.

Nestled on a wooded hillside overlooking the blue waters of Road Harbour, about a mile from Road Town, TREASURE ISLE HOTEL is across the street from the jetty where an Aquatic Centres dive boat leaves each day. You can store your dive gear at the shop. All of the rooms are air-conditioned and have individual balconies, phones and room service. There is a conference room for groups. Treasure Isle caters to divers. They will pack a lunch for your boat trips and will hold your dinner (upon request) if you're night diving.

BLUE WATER DIVERS specializes in leisurely trips from about 9:00 am to 2:00 pm to sites from Northern Tortola to Ginger Island. They especially like relaxing

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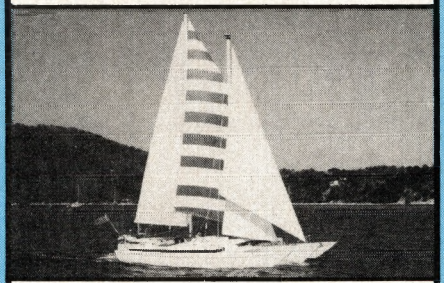

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BVI

dives in such places as Brenner's Bay where you can start at about 15 feet and drop down to black coral at 80 feet. Owned by Mike Royale and Cyril Romney, and at Nanny Cay Marine Centre, Tortola, Blue Water Divers uses the 27 foot *Blue Runner* to carry up to eight divers and the 30 foot *Akadba* for up to 14 divers. They have packages with SEBASTIANS ON THE BEACH HOTEL and SUGAR MILL HOTEL.

Caribbean Images, based in Tortola, offers overnight processing for Ektachrome (and other E-6 compatible) color slide films. Owner Dave Mansfield offers six, three and one day U/W photography courses and rents Nikonos cameras, strobes and an U/W video camera. He can videotape divers underwater and provide an edited 20 minute tape with background music. He can rendezvous with your boat. His glassbottom boat is great for non-divers.

DIVE BVI, owned by Joe Giacinto, is based at Virgin Gorda Yacht Harbour. Managers Ken and Barbara McDonnell offer two tank dives for up to 12 divers on the 36 foot *Seacat*. Their central location allows them convenient access to sites as far north as the *Chikuzen* and as far south as Norman Island. Ken enjoys diving and enjoys variety. So even if you're the only diver, he will take you to a good site. Although Dive BVI offers resort to full certification courses, they don't mix new students with experienced divers.

Dive BVI has hotel packages with five resorts: DIAMOND BEACH CLUB, FISCHER'S COVE BEACH HOTEL, GUAVABERRY SPRING BAY VACATION HOMES, OCEAN VIEW HOTEL and the OLDE YARD INN.

KILBRIDES UNDERWATER TOURS, based at BITTER END YACHT CLUB at the eastern end of Virgin Gorda's North Sound, is run by Jimmy and Gary Kilbride. Their 31 foot *Shango* and 42 foot *Shah* rendezvous with yachts and also pick up divers at hotels each morning, returning in the early afternoon. Jimmy has worked BVI waters for eight years and lived on Anegada Reef during the mapping of the reef for the government. Thus, he knows the sites. He is a natural U/W model and has appeared in advertisements and a TV commercial.

The Kilbrides dive Anegada Horseshoe Reef, with its many old wreck sites, only an eight mile trip from the North Sound. They are also close to Dog Island, and dive as far south as the *Rhone*. The Kilbrides pick up divers at all the North Sound resorts. To get to Bitter End, Biras Creek, Drake's Anchorage and Tradewinds, take a taxi to the dock they specify (usually Leverick Bay or Gun Creek) and they will pick you up by boat.

Kilbrides has a dive package with DRAKE'S ANCHORAGE, where a maximum of only 30 guests have an entire island, with three miles of shoreline and hiking trails through the hills, all to themselves. There are ten bungalows along one of the beaches, you can swing in your own hammock, enjoying the breeze.

LEVERICK BAY HOTEL has two and three bedroom housekeeping villas and condos and offers two beaches, the only public freshwater pool on Virgin Gorda and watersports. The restaurant is open from 8:00 am to 9:30 pm, so you can eat after a late dive.

TRADEWINDS RESORT features individual cottages with a panoramic view of the North Sound from the lee side of a terraced mountain. Tennis, sailing instruction and water skiing are available. They serve gourmet food in their large, covered, open-air dining room.

UNDERWATER SAFARIS, owned by Gail and Bob Stafford, is at the Moorings Mariner Inn, Road Town, Tortola. They also have auxiliary air stations at Cooper Island and Banana's Marina (West End, Tortola). The Staffords have been in business for five years and have the largest retail shop in the BVI. Because many of their dives are two tank morning and two tank afternoon trips, you have a half day free for other activities. Service is their goal—they put the tank on your back and help you out of the water after the dive.

On long trips, U/W Safaris pulls in at the Cooper Island Beach Club for a relaxing lunch at the beachside open-air restaurant. Shaded by palm trees, it is an idyllic, postcard setting. On half day trips, rather than remain on a rocking boat, they stop for a cool drink at the club.

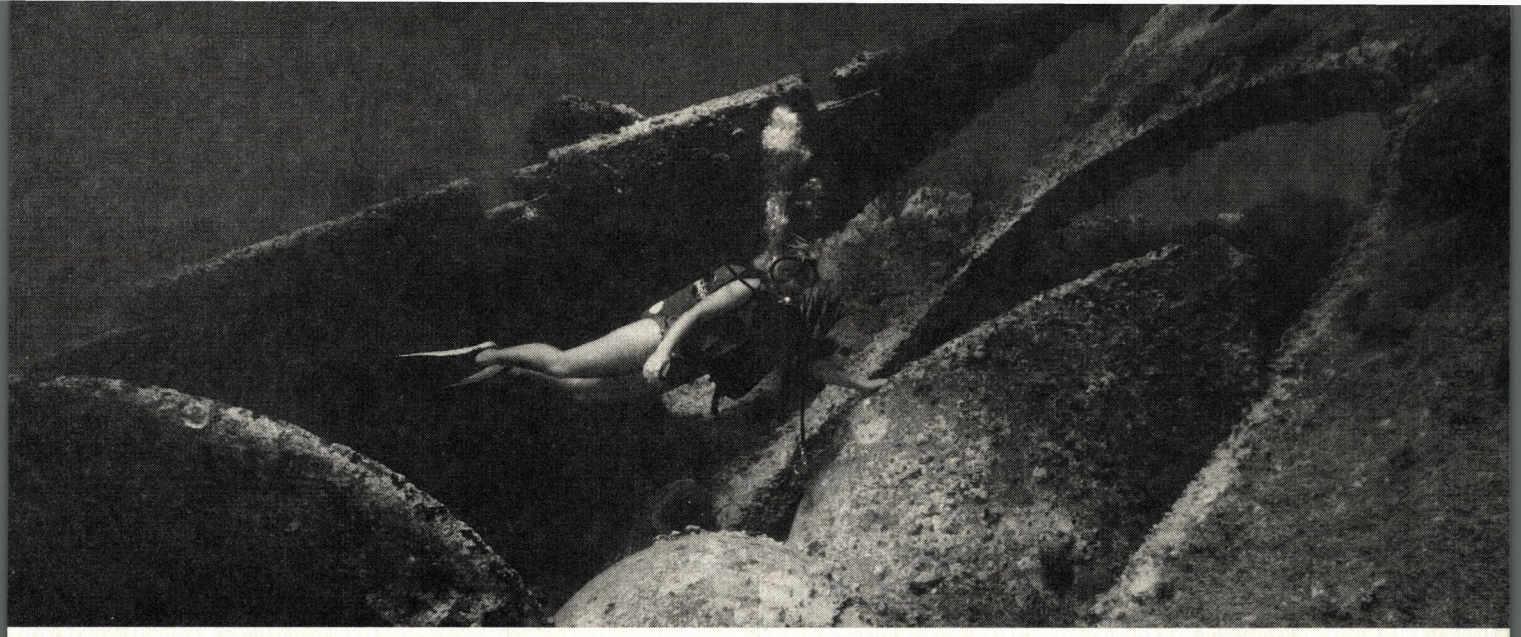
If you dive with U/W Safaris, we suggest staying at the MOORINGS MARINER INN, where you can lounge by the poolside bar and restaurant just a few paces from the U/W Safaris dive shop and boats. All of the rooms have kitchenettes and a covered terrace where you can relax with a snack and listen to the rustle of palm leaves in the breeze. A grocery store and car rental service are within 100 yards.

LIVE-ABOARD DIVE BOATS

In the BVI, there are many different ways you can live aboard your dive boat. You can individually book onto a scheduled trip or charter your own boat. The variety of boats is overwhelming: Sizes vary from small 38 foot sailing yachts to 100 foot motor vessels. There is sure to be a boat to fit your needs.

Three live-aboards that accept individual bookings, as well as group charters, are *Lammer Law*, *Misty Law* and *Tropic Bird*.

LAMMER LAW is enormous! The 22 by



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The best dive sites take only minutes to reach. *The Rhone*, for example, is just 30 minutes away.

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We can dive at an almost infinite number of great sites. But, here are 12 of our best "regulars":

Alice in Wonderland, Blonde Rocks, Dead Chest, Dry Rocks East, Wreck of *Imene*, The Indians, Marco Point, Painted Walls, Ring Dove Rock, Spyglass Wall. And, naturally, all of *The Rhone* and Rhone Reef.

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Our base in Road Town is the lovely West-Indian style Moorings Mariner Inn.

Lanai-patio or balcony rooms (each with kitchenette) all overlook the marina, right at water's edge on Road Harbor. Alongside our romantic restaurant, bar and freshwater pool. For non-diving hours, there's tennis, sailing, shopping in our boutique or charming Road Town. Non-divers in your party will also find plenty to do.

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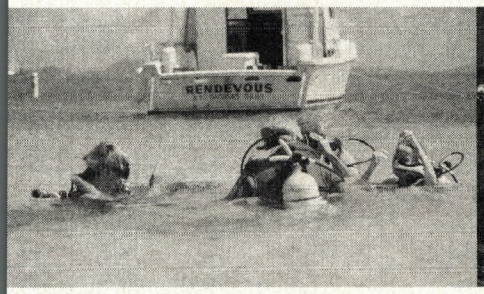

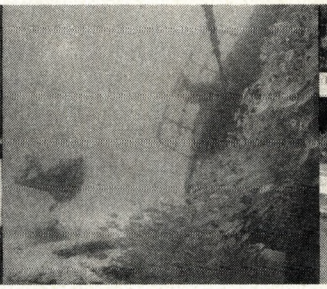

UNDERWATER SAFARIS TORTOLA BVI

UNDERWATER SAFARIS

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25 foot saloon is as large as the lobbies of many medium sized hotels we've seen. For special groups, the saloon can seat up to 30 people for lectures and A/V projection. The staterooms, five with double beds and four with single beds, have private bathrooms and are the size of small hotel rooms. Advertised as "the largest trimaran in the world," *Lammer Law* measures 42 by 95 feet and has 2,500 square feet of sun deck—all for only 18 guests.

MISTY LAW, also owned by the Muirheads, is a smaller version of *Lammer Law*. Measuring 26 by 56 feet, *Misty Law* carries from four to eight guests in three cabins with twin beds and one cabin with a double bed. Each cabin has its private bathroom and hot water.

TROPIC BIRD is a large, sleek, 98 foot motor vessel that accommodates 8 to 24 divers in 12 large, air-conditioned cabins with upper and lower berths. Other facilities include two showers, a sauna and five heads. The entire aft section of the main deck is devoted to the large saloon

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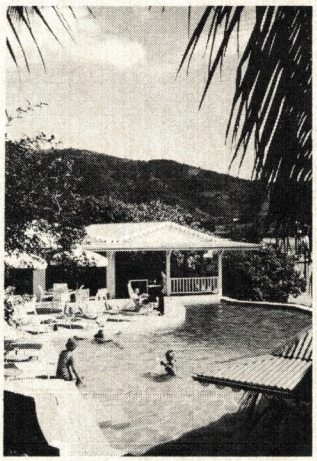

TREASURE ISLE HOTEL

Treasure Isle Hotel

Tortola, B.V.I.

Overlooking the crystal blue waters of Road Bay, the Treasure Isle Hotel can cater to every diver's need while on land. Featuring beautiful appointed fully air conditioned rooms and suites all with balcony. Enjoy cocktails in the Spy Glass Bar, fresh water pool, barbeques and the Veranda restaurant but above all Treasure Isles' informal island atmosphere.

AQUATIC CENTRES

George and Luana Marler opened Aquatic Centres in 1971 and have been dedicated to providing the best in diving pleasure. Hundreds of reefs surround the British Virgin Islands, offering a wide variety of exciting dives, from the infamous "Wreck of the Rhone" to reef dives, deep water or shallow water dives. From the novice to the experienced, enjoy the exhilarated feeling of underwater life in the British Virgin Islands with those who know.

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BVI

(complete with VHS video) and the aft diving deck. The galley is amidships and the large, comfortable bar/lounge is forward. Buffet style meals are served in the aft saloon or in the open air comfort of the aft deck. Food is plentiful and varied and includes dishes ranging from spaghetti to London broil or chicken tarragon.

If you want a lot of diving, *Tropic Bird* will deliver. Cruises usually run from Saturday to Saturday and diving is truly unlimited—within the tables, of course. Captain Mike Bloss has been diving the BVI for seven years and is still discovering new sites. He personally makes every dive—sometimes up to six or seven a day—with his guests. Mike even guarantees that if you miss any diving days because of weather, your entire package price will be refunded. This doesn't mean that you have to dive in bad seas, it just means that Mike can always find a calm site and a worthwhile dive.

CHARTER YACHTS

Chartering a yacht is surprisingly affordable, especially if you have a small group of friends you enjoy traveling with. The size of the crew may vary, depending on your boating skills and how much you wish to become involved in sailing. If diving is important; specify ahead of time if you need an instructor, divemaster or guide who knows the sites. If you don't want scuba gear taking up valuable space aboard the boat, simply rendezvous with a BVI dive operator. Your captain calls the dive boat and arranges for them to pick you up at your anchorage and take you diving.

PPALU (pronounced: Pa loo) is a fast 28 by 75 foot catamaran that can be chartered by groups of four to eight persons, with up to four divers. Sailing her is a thrill—she's exceeded 26.8 knots. *Ppalu* has four breezy cabins with double bunks and sinks and two separate heads.

PROMENADE, a 34 by 60 foot trimaran built and operated by David Dugdale, accommodates up to ten guests in five double cabins complete with four separate heads and showers. Fiona Baldrey prepares truly gourmet cuisine. The meals are enhanced by the spacious seating on the aft deck. There is a compressor aboard as well as a convenient swimstep and ladder.

MOORINGS LTD., adjacent to the Moorings Mariner Inn on Tortola, is a complete yachting resort. There are 82 sailing yachts, from 39 to 60 feet, for bareboat or crewed charters, as well as

a complete marina and provisioning service. Scuba equipment rental or scuba rendezvous can be arranged with Underwater Safaris, in the same marina.

NORTH SOUTH YACHT CHARTERS is at the Virgin Gorda Yacht Harbour, within easy walking distance of Dive BVI, The Bath and Turtle Pub and Restaurant, and the Ocean View Hotel. They have 30 C & C sailboats for crewed or bareboat charter. In addition to provisioning and arranging scuba services with nearby Dive BVI, they can provide you with full travel arrangements to the Virgin Islands, specializing in Virgin Gorda. They can often get you special low air fares through charter planes and volume discounts.

PROSPECT REEF RESORTS also has an excellent, protected marina and offers skippered and bareboat charters. Scuba arrangements can be made with Aquatic Centres at the marina.

TORTOLA YACHT CHARTERS, at Nanny Cay, Tortola, has a fleet of Endeavor sailboats.They offer the Virgin Odyssea Package in conjunction with Aquatic Centres. It can be adapted to providing rental scuba gear, diving on your own or rendezvous diving with Aquatic Centers. You can book with the J. W. Pepper Co. or with Tortola Yacht Charters.

VIRGIN ISLAND SAILING, LTD. is the broker for about 25 crewed charter yachts based in the BVI. You tell them the size of your group, your sailing experience and your diving needs, and Ann Casebourne will help you select a boat. In addition to sailing boats, such as *Promenade*, Ann can arrange charters on motor yachts, such as *La Buscadora*.

LA BUSCADORA is a 76 foot luxury motor vessel that takes only four guests in two large, double staterooms with private baths and individually controlled air-conditioning and stereo. Owner/captain Russ Skidmore, also a divemaster, prefers certified divers. He has a compressor aboard, a large dive gear storage area, a swimstep platform and a 20 foot chase boat.

DIVING IN THE BVI

You can dive year-round in the BVI, especially on the lee sides of the islands. In the summer, you can often dive on both sides of the islands, including the north side of Tortola, the east side of Virgin Gorda and the south side of Ginger Island. These relatively virgin dive sites offer an exciting variety for even the seasoned visitor. Some of the dive operators, especially the live-aboard and charter boat operators, have their own special sites that are not generally known.

Alice in Wonderland features live coral heads, 10-15 feet high, with sand valleys between them.

Anegada Reefs has hundreds of sites, including the wreck of the ***Paramatta***. Resting in 35 feet of water, she is broken into two sections, each adorned with elkhorn corals.

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The Blinders are the underwater equivalent of The Baths—a labyrinth of caves and tunnels.

Boxfish Reef is a discovery dive where you may see large turtles, sleeping sharks, spadefish and ocean triggers.

The ***Chikuzen*** is an intact, steel hulled, 246 foot refrigerator ship that was scuttled in 75 feet of water in the Sir Francis Drake Channel in 1981.

Dry Rocks East has rocks awash with surf as well as large submerged rocks in shallow water and down to 85 feet. Watch for schools of spadefish, horse-eye jacks, turtles and angelfish.

Markoe Point is an exciting site where you see tarpon, rays or turtles at depths down to 65 feet. Looking upward, the surf breaking over the top of Markoe Point has the appearance of clouds swirling around a mountain peak.

Painted Walls is a close-up photographer's dream. You see one patch of color that is dazzling, then you see another patch that looks even better and then another that is brighter or better composed. You could make several dives here without photographing everything.

The **RMS *Rhone*** has helped make the BVI a world famous dive destination. A violent hurricane smashed this 310 foot, steel hulled Royal Mail Steamer on the rocks of Salt Island in 1867. Her 150 foot bow section, complete with bowsprit and foremast, lying on its starboard side in 80 feet of water, is remarkably intact.

***Rhone* Reef** has three caves in less than 20 feet of water and about 15 feet apart. The first has a rounded central area with an overhead exit; the second has a small skylight that admits shafts of sunlight; and the third is a dead-end cave that is home to a school of copper sweepers. Each cave is lined with colorful sponges and marine growth.

PLANNING YOUR TRIP

Write to the BVI Tourist Board, 370 Lexington Ave., New York, NY 10017, or call (212) 696-0400, for a free copy of the British Virgin Islands Tourist Directory. It gives complete listings of airlines and water ferries serving the BVI, rental cars, hotels, yachting marinas, maps and other valuable information. Ask them to include the brochures for the BVI dive operators. The basic entry requirement to the BVI is a valid passport. U.S. and Canadian citizens can use voter registration cards or authenticated birth or citizenship certificates.

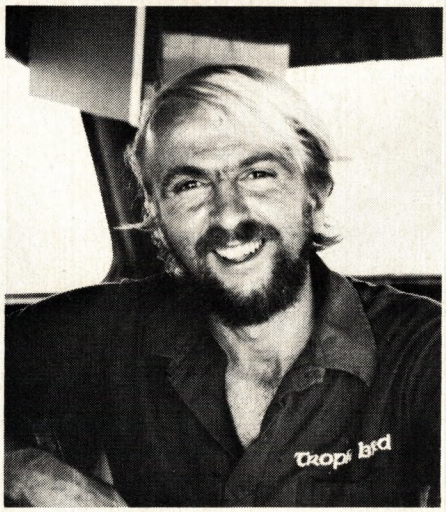

Photo Credit: Frank T. Shane

Captain Mike Bloss, M/V Tropic Bird

Hi,

I'm Mike and this is my boat. I'm really proud of her. 110 feet on deck and air-conditioned comfort below. There is lots of play space and room for your dive gear. We serve you three really good meals each day, prepared by our experienced galley crew. (You don't have to live off the fish you shoot, in fact we don't let you shoot fish; leave them for the next guy to see. Take their pictures, not their lives.) Buffet dinner is accompanied by wine, conversation with my crew of dive masters and instructors, tall tales by me, and laughter by you-all. TV movies and games are available if you can stay awake after a day of diving.

Now that you know what to count on on the surface let me tell you about the important part of the trip – DIVING. We have done our first dive and had breakfast before most other boats have reached their dive sites - you are living over your dive. There is no waiting on the dock, no lugging heavy gear, no sandy beach entries and exits. The BIRD's huge dive platform makes in and out easy, as easy as getting out of bed, putting on your gear, and stepping over the side. We feature clear, warm water; plenty of colorful fish, and so many dive sites it's hard to keep track of them. Unlimited diving to me means diving 'til the tables tell you to stop; there is no "12 dives plus one night dive" limit on my boat. I'll guarantee you can dive every day. Go for it!

How many captains have you been diving with? I go on EVERY dive, unless you have run me out of bottom time. Try me - I LIKE TO DIVE.

We give you what other dive operations only offer - all you have ever dreamed of in a dive vacation. Our groups keep coming back to TROPIC BIRD again and again. If you haven't met us yet, come on down; you-all who know us "Let's get wet AGAIN"!

Once you have been here you'll occassionally get a letter in the mail like this one to tell you what we have been doing lately and to say hi. The difference will be 1) my typing 2) someone edited this, correcting my speling and gramar, (I hope he didn't miss too much!) You won't miss anything on TROPIC BIRD (just us after you have gone home).

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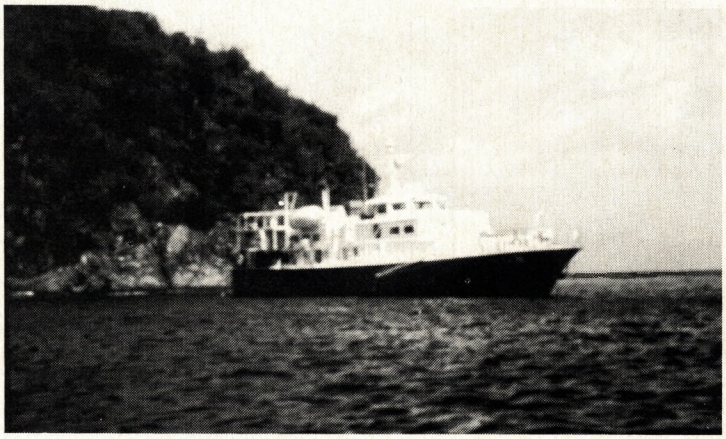

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SDM

travel SECTION

SEA AGGRESSOR

Million Dollar Floating Dive Hotel

TEXT AND PHOTOGRAPHY BY CARL ROESSLER

Under a blazing Bahamian sun, a gleaming white cruiser with bold blue trim thunders along at 15 knots on her way to her next dive site.

This ship is the magnificent new 90 foot *Sea Aggressor*, sister ship to the *Cayman Aggressor*. With the advent of these cruisers, divers can now enjoy comfort and privacy as they explore the Caribbean's finest reefs.

What is it that makes this *Aggressor* series of dive cruisers revolutionary in the development of dive travel? First and foremost, no expense has been spared in making these boats outstanding in every way. When you step aboard *Sea Aggressor*, you immediately notice fine touches. Her capacious saloon has carpeting and fine wood paneling; the chairs are sturdy, cushioned and comfortable. Above all, this saloon is spacious enough for 20 divers to enjoy a dinner, drinks or a video movie without crowding.

And, what dinners! Onboard hosts Dirk and Joann Huesken are professional restaurateurs who insist on food of the highest quality. *Sea Aggressor's* chef has experience serving hundreds, so dinner for 20 is easy.

From the dining saloon, we may wander topside to the sundeck. This spacious structure is a quiet aerie, high above the bustle of the dive deck, equipped with cushioned lounges that lull unsuspecting divers into snatching sun-naps between dives.

Not only is this sundeck a great place to relax, it's the ultimate place for a Caribbean cookout. My group gluttoned through a feast of shrimp, spareribs barbecued on the outdoor grill, corn on the cob, salad and fresh cornbread. Add the beverage of your choice, a sky blazing with stars and good company—no wonder dive groups are already booking 1986!

For personal comfort, imagine this: *Sea Aggressor* has a 600 gallon per day desalinator, piping hot showers and six tons of air-conditioning just for the customer cabins. These are the kinds of amenities divers have formerly found only in hotels—now you can have all this right at the dive site!

Sea Aggressor is equipped for truly unlimited diving. She anchors over great sites, enabling her passengers to enjoy dawn dives, night dives and every kind of dive in between. There are gear boxes for each diver and easy stairway access to the water. All diving is done from the stern platform.

During the months of April to September, *Sea Aggressor* is based in West Palm Beach, enabling some East Coast groups to drive to her berth with no airline travel needed.

One of the thrills recent groups have enjoyed during their Florida to Bahamas crossing is being in the water with large schools of dolphins. In fact, a film crew from Don Meier Productions' Wild Kingdom television show has just returned from ten full days aboard *Sea Aggressor*, filming an epi-

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From September 15th to November 16th you can dive with UNEXSO, one of the world's best equipped sport diving resorts, while staying at the luxurious Atlantik Beach Hotel, located right on the beach. Prices start from as low as $195 per person and include many unique unlimited features.

For more information call your favorite travel agent or the Atlantik Beach Hotel. (809) 373-1444 Freeport, or Toll Free 800-622-6770.

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SEA AGGRESSOR

sode on these marine mammals.

It appears the dolphins are not only unafraid of humans, but even enjoy these encounters. Many divers now have rich collections of dolphin photographs they couldn't have taken any other way. We do not know whether the dolphins remain in the same area year-round, but from April to November this seems to be a sure thing on every cruise.

The diving during the Sunday through Saturday cruises is highly varied. There are two easily accessed wrecks. One, dating from the Civil War, is similar in its thriving fish population to the wreck of the *Rhone* in the Virgin Islands. Another site worth mention lies 60 miles south of Freeport in the Berry Islands. Recent groups have found its rich coral shallows teeming with tropical fish and invertebrate life. North of Grand Bahama, *Sea Aggressor* has discovered an enormous wall. In one spectacular area, coral pinnacles on top of it rise to within 60 feet of the surface, then plummet to thousand-foot depths.

Sea Aggressor will spend each winter based in the Bahamas, with groups flying to Freeport to come aboard from October to March. Then, in April, the vessel will return to greet new passengers each week in West Palm Beach.

The "new *Aggressor* fleet" now consists of the *Sea Aggressor* and the *Cayman Aggressor*, dive flagship of the Cayman Islands. And, a second *Cayman Aggressor*-series vessel goes into service in the Caymans this fall. The *Aggressor* fleet is revolutionizing diving access in the Bahamas and Caribbean.

For individual bookings or for group charters contact See & Sea Travel, Inc., 680 Beach Street, Suite 340, San Francisco, CA 94109 or call (800) DIV-XPRT, in California call (415) 771-0077.

CAYMAN DIVING LODGE

Two-for-one air fares and group discounts are just part of a package offered by Cayman Diving Lodge through December 15. Discounts as much as 30 percent are currently available, with as many as three people invited to dive free with their groups. The special two-for-one air fare is offered in conjunction with Cayman Airways. The package price includes all meals, airport/lodge transfers and gratuities. The dive portion includes tanks, backpacks, weightbelts and divemasters. Groups of 15 or more will have their own boat and choice of dive sites. In addition to two, one tank dives daily, there is unlimited shore diving.

Dive store operators or group leaders are invited to write, on letterhead stationery, for complete rates. Contact Pat Scharr, Cayman Diving Lodge, P.O. Box 11, East End, Grand Cayman, BWI; telephone (809) 947-7555.

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SPANISH COVE AND SOUTH COVE

Grand Cayman's Doubleheader

TEXT AND PHOTOGRAPHY BY STEPHEN FRINK

Below: An aerial view of Spanish Cove Resort showing beach, freshwater pool, boat dockage and landscaped grounds. Spanish Cove offers 46 double rooms and its fleet of dive boats can comfortably accommodate up to 120 divers at a time. The dive itinerary includes North Wall sites and other locations such as the *Oro Verde* (left).

Left: South Cove Resort dive boats range west and south to sites from Hepp's Pipeline to the South Wall. Waldo's Lair (below) is just offshore the resort. South Cove and Spanish Cove offer reciprocal diving privileges.

Upon first inspection, Spanish Cove and South Cove appear to be uniquely separate dive resorts. The locations are substantially different. Spanish Cove occupies a lushly landscaped acreage adjacent to the famous North Wall. South Cove is nestled snugly among the casuarina trees lining the ironshore just south of Georgetown, Grand Cayman's center for shopping and commerce. Spanish Cove features 46 double rooms, four of which are suites, while South Cove is a more intimate 22 room complex. Each resort seems to have evolved its own personality as well. Spanish Cove is the more upscale and luxurious property of the two. South Cove, however, has developed a loyal and satisfied repeat clientele based on a high degree of personal service, clean and comfortable accommodations and good food. Despite these apparent dissimilarities, the two resorts share much in common. They are both owned by the same company headed by Jack Peeples, a prominent Miami attorney and restaurateur with a keen interest in Caribbean diving. The same booking and reservations service handles each property. And, perhaps most importantly, the same commitment to providing the best in diving services to their guests motivates the staff at each property.

With its distinctive main lodge and dining area constructed of native coral stone, freshwater swimming pool, landscaped wooden walkways winding throughout the property and beachfront with breakwater, Spanish Cove is perhaps the most aesthetically pleasing hotel on Grand Cayman. Among the unique amenities is a restaurant especially noted for its fine cuisine and international buffets; two bars; a video center featuring wide screen color TV and a satellite dish; a covered gazebo with hammocks; a massive breakwater providing easy entry for shore dives and protection for dockside dive boat loading; boardsailers; volleyball; a fully equipped dockside dive shop; and a photo center and conference facility without the peer in the Caribbean resort community.

Since the majority of Spanish Cove guests are divers, a closer analysis of the personnel, equipment, boats and dive sites is relevant. The dive operations superintendent is Harry Ward, a Florida Institute of Technology graduate. He is a veteran of over four and one-half years in the Grand Cayman dive resort business, more than two years of which were spent at Spanish Cove. Alan Bloomrosen is equally experienced in the Grand Cayman dive scene. With a fine staff of boat captains, instructors and divemasters, Ward and Bloomrosen have instituted a very smooth-running facility. The boat fleet is among the most impressive assets. It presently consists of four fiberglass deep V-hulled custom dive boats

(Continued on Page 125)

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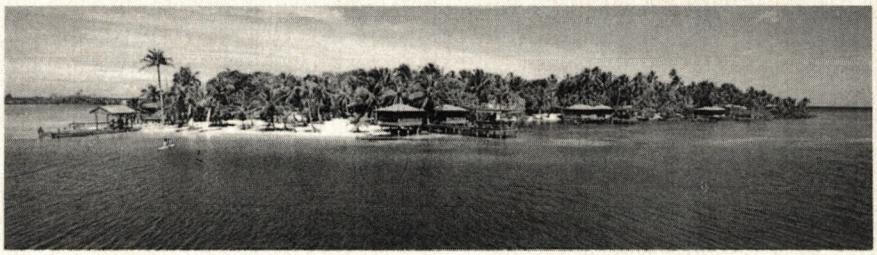

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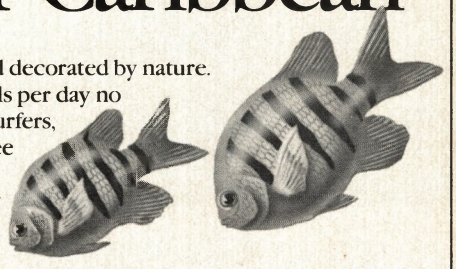

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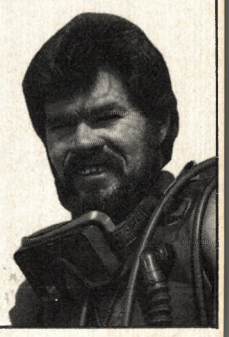

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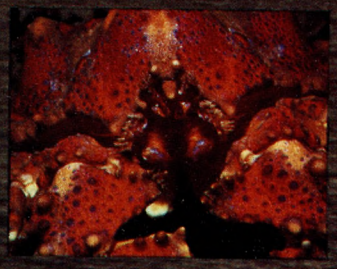
The Pacific Northwest

Puget Sound • Strait of Juan de Fuca
San Juan Islands • Canadian Gulf Islands



Colorful king crab

Happy Pacific Northwest divers

Wolf eel

TEXT AND PHOTOGRAPHY BY CHARLES SEABORN

There is an abundance and diversity of natural recreational areas available in the Pacific Northwest. From mountains to deserts, every biome is accessible from major population centers such as Seattle and Vancouver, B.C. A large proportion of these areas encompass marine habitats such as Puget Sound, the American and Canadian San Juan Islands and the Strait of Juan de Fuca. All offer unique and diverse diving opportunities. Additionally, other recreational activities such as salmon and deep sea fishing, sailing, boating and hiking can be combined with a diving vacation.

An abundance of easily observable wildlife—both above and below water—is another feature of these wild areas. It is not uncommon for divers in the San Juan Islands to sight river otters along the shore (usually mistaken for sea otters), or eagles plucking an occasional fish from the sea. Deer are common on some islands and bird watchers can see a considerable number of both sea and shore species on one cruise through the San Juans or along Puget Sound shores.

Bridging the air/water interface is a diverse and abundant collection of marine mammals. Some, such as harbor seals, can be observed above and below water, sunning themselves on rocky outcrops, searching for food, or checking out a rubber-clad temporary marine mammal. During the summer months California sea lions have been sighted in Puget Sound and waters north, while in the winter the larger (and more unpredictable) Stellar sea lions haul out in parts of the southern

Giant Pacific octopus

Canadian Gulf Islands. Adult male Stellars may exceed 12 feet in length and weigh 2,000 pounds or more!

Then there are the whales, dolphins and porpoises. Killer whales are so commonly seen in the American and Canadian San Juans that local marine biologists have circulated printed fliers to the general public to aid in their study of local groups (called pods) of orcas. The pods have been assigned letters for identification, J pod being one of the largest and most often seen groups. Dive charter boats to the San Juans typically encounter marine mammals of some species on nearly every trip, be it a group of harbor seals or a half dozen Dall's porpoise briefly riding the boat's bow wave.

Beneath the waters of Puget Sound, the San Juans and connecting waterways, lives a surprisingly colorful and diverse assemblage of marine life. Biologists generally measure the richness of a marine habitat by the number of different kinds of plants and animals present. While there are no coral reefs in the Pacific Northwest, the numerous submerged rocky reefs in the area provide a place of attachment for the literally thousands of species of sponges, encrusting bryozoans, sea anemones, barnacles and, yes, even a couple of coral species (of a non-reef-building bent). Under the diver's light these encrusting organisms provide a backdrop of color and form equal in intensity and impact to most tropical reefs. Many of these critters provide either food or shelter for a host of errant organisms such as hermit crabs (27 species), sea stars (the world's

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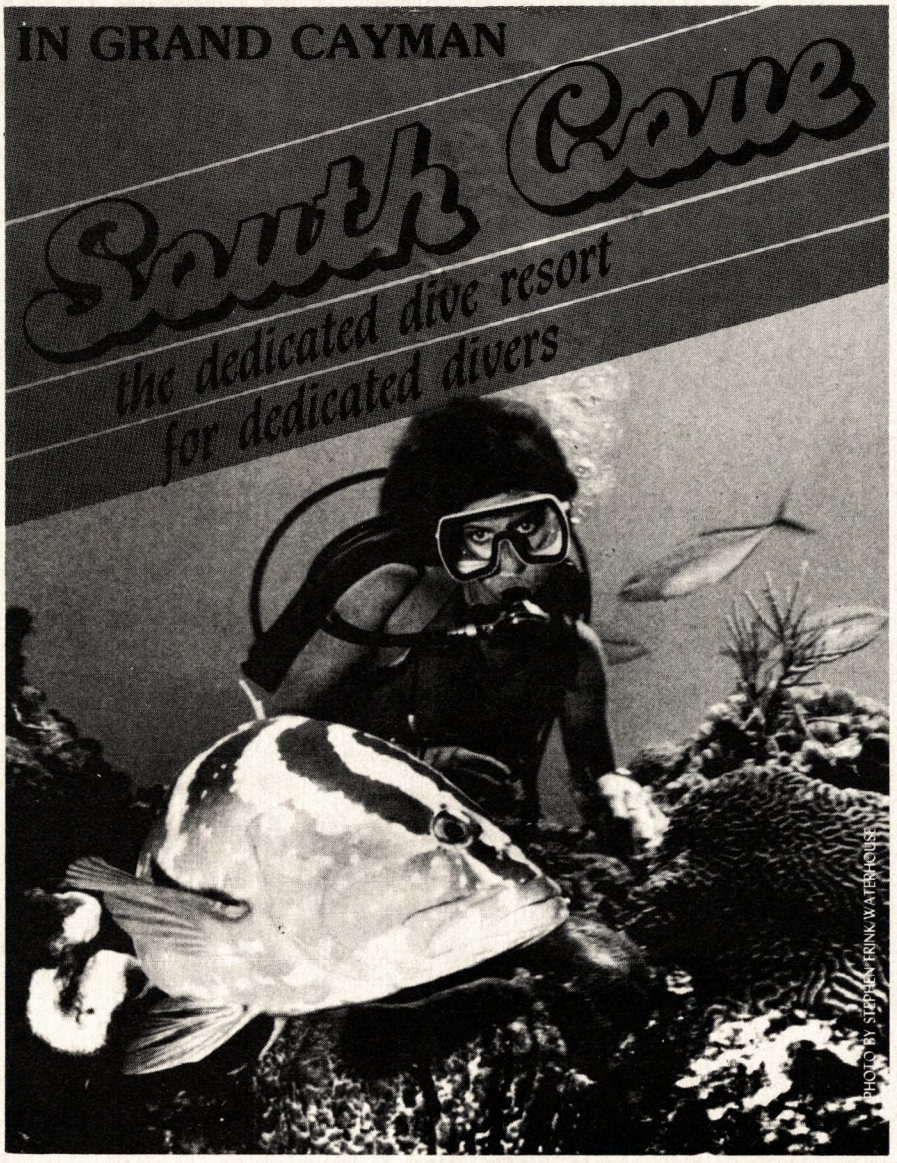

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Pacific Northwest

greatest diversity), nudibranchs (from the quarter inch *Rostanga* to the ten inch giant swimming *Dendronotus*) and the list goes on.

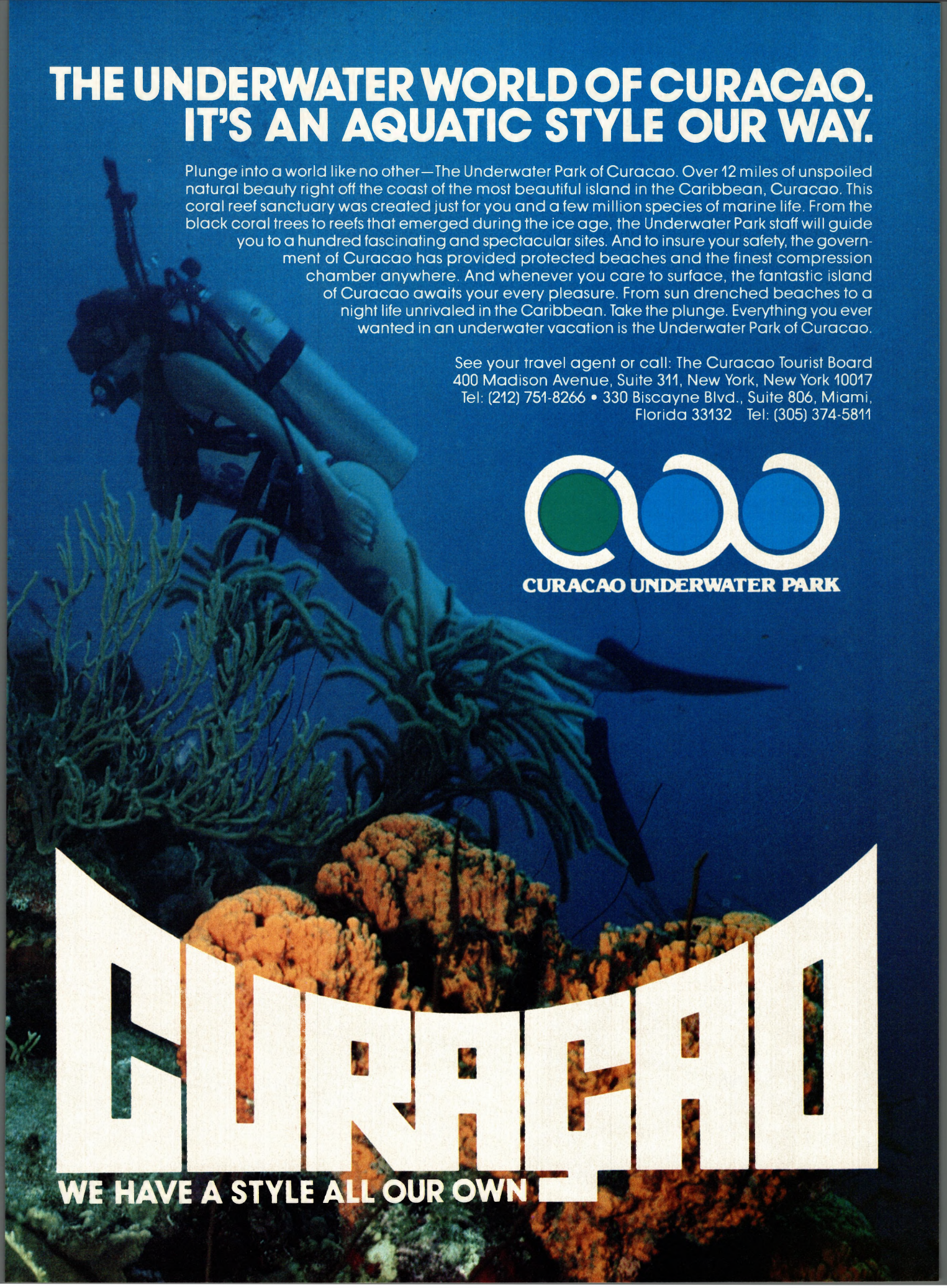
Of the mega-invertebrates, the giant Pacific octopus takes the prize. Estimates of an average size specimen hover around 30-40 pounds, with an arm span of 8-10 feet. Maximum sizes have been documented to 90 pounds (18 feet across). Watching even a 40 pound animal squeeze its entire body out a two inch crack in a rock and start marching across the seafloor is excitement enough, not to mention instant color changes and a defense posture that includes trying to look even larger to would-be attackers. As is the case with most "dangerous" marine life, the key word missing in the description is *potentially* dangerous. Like most wild animals, giant octopus are docile and non-aggressive unless harassed or otherwise threatened. Watching one of these cephalopods underwater is, by itself, worth a trip to the Pacific Northwest.

Other invertebrate notables of the edible variety include Dungeness crab, coon-striped shrimp and spot prawns (up to ten inches), giant scallops, mussels and clams. And, let's not forget the abalone—yes, abalone—a smaller version than its southern cousins (and appropriately named *Haliotis kamtschatkana*) but just as tasty. For the more adventurous there are urchin roe and sea cucumber to round out the invertebrate fare.

One notable aquarist, upon taking a position at the Point Defiance Aquarium in Tacoma, described Puget Sound as the "land of the brown fish." There's no denying that the fishes of the Pacific Northwest are less colorful than their tropical counterparts. What they lack in color, however, they make up for in shape and form. The old adage "form follows function" clearly applies to these cold water fishes. Some of the more peculiar include the sailfin sculpin (seen on night dives), the grunt sculpin (the Pacific Northwest's answer to the seahorse) and the spiny lumpsucker (four inches max.).

What about eels and sharks? There are no cold water morays, wolf eels fill their niche, even though they are really elongated true fish. Males can attain lengths of up to eight feet, females are slightly smaller. Apparently wolf eels remain in semi-permanent dens for several years, a couple sharing one rocky area. As in the tropics, local divers develop a close relationship with certain eels, giving them people names and bringing them sea urchins, scallops and crabs.

With respect to sharks, the most com-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Pacific Northwest

mon is the three to four foot long dogfish shark. "Most common" means this is the only reasonable facsimile of a shark you are likely to encounter. Late in the summer, and farther north in British Columbia, it has become fashionable for local divers to search for and be photographed with the larger sixgill shark. Up to ten feet long, and resembling a 747, these sharks have been found in August in 50-80 feet of water. During the rest of the year they reside at 200-600 feet.

King of the local gamefish is, without question, the lingcod. Actually a bottom dweller, these voracious predators can weigh up to 90-100 pounds, with the average varying, with location, from 10-30 pounds. While the flesh has a slight greenish tint, it is light and firm. Cabezon are also local favorites, up to 14 pounds. With 50 species to choose from, rockfish are perhaps the most commonly speared fish and are excellent eating. Needless to say, local fishing regulations for any of the above (including shellfish) should be checked and observed before hunting or collecting. Lingcod are under very specific regulations, which vary seasonally and differ between Washington and Canada.

Since the water temperature remains between 45-55°F throughout the year, quarter inch wetsuits are the minimum protection, with most folks wearing drysuits these days. Visibility varies seasonally, coinciding mainly with plankton blooms. Thus, it is usually the worst in the spring and summer, averaging between 10-15 feet (with a low of 1-3 feet). Fall and winter are the clearest, with September being a special month. Visibility averages 20-40 feet during these seasons with 70-80 feet occurring regularly in some northern locations. The absolute best time to dive the Pacific Northwest is on a cool, clear fall day, when clear water and sunlight create fantastic conditions.

Diving these waters requires planning and some experience, particularly with cold water and current. Twice daily all of Puget Sound and its connecting waterways are partially flushed with clean ocean water. A typical change in tidal height is between 6-10 vertical feet with extremes of 15 feet. Consulting local tide and current tables is generally a must to determine slack water periods. Proper gear selection for cold water diving is also a prerequisite. Local dive stores welcome both new and visiting divers. Most operators can provide detailed information on the location of dive sites, boat charters and accommodations. At the very least, they will tell you what to expect from Pacific Northwest diving.

DIVE SITES

The scope of this article takes in three major diving locations in Washington State and British Columbia: the Strait of Juan de Fuca, both the American and Canadian San Juan Islands and Puget Sound. The following should be considered a general guide to some of the more frequently dived spots in each of the three regions.

STRAIT OF JUAN DE FUCA

The Pacific Ocean pours through the west-east running Strait of Juan de Fuca, eventually emptying into lower Puget Sound. Owing to its proximity to clean, nutrient-rich water, some say the diving at the mouth of the strait and along both its shores is the best around. At its westernmost tip sits Neah Bay. Because of its exposure to open ocean swells, diving Neah is somewhat seasonal. Both Tatoosh Island and Duncan Rock experience remarkably clear water with 100 foot visibility reported occasionally. Marine life is so abundant here that Neah Bay is a preferred collecting site for the staff of both the Seattle Aquarium and the Point Defiance Aquarium in Tacoma.

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Traveling east along the Washington State side of the strait one comes to Tongue Point near Port Angeles. Off the point lies the wreck of the *Diamond Knot* in 75-130 feet of water. A dive for experienced divers only, the wreck is home to huge lingcod and a variety of encrusting organisms. Fair weather is a prerequisite for this dive as well.

Continuing east one arrives at Port Townsend. An interesting dive right in the middle of town is the old Union Dock. Easy shore access and little current makes this an ideal dive for beginners. The pilings are covered with sponges, anemones and other encrusters, making for great macro photography. Outside of town is Fort Worden, a good place to launch a boat for a dive on Point Wilson. Definitely a current dive, the rocky reefs around the point feature extensive beds of bull kelp in the summer, providing excellent fishing. Some really large lingcod have been pulled out of Point Wilson.

CANADIAN AND AMERICAN SAN JUAN ISLANDS

At the intersection of the easternmost part of the Strait of Juan de Fuca, the Washington State mainland and the southernmost tip of Vancouver Island are a group of islands that are as close to the tropics as you can get—without being in the tropics. These islands reap the benefits of full exposure to nutrient-rich ocean water brought in through the strait, as well as being a bit inland and thus protected from direct open ocean swells. There's no getting away from current, however, and diving in these islands requires some careful planning and forethought. Diving is year-round in the islands and every facet is available from photography to bottle collecting. Charter boats run out of both Canada and Washington (usually Vancouver or Victoria and Anacortes or Seattle, respectively) to the San Juans.

Some divers say that wherever you "drop the hook" in the San Juans you will find good diving. One specific location would be Gabriola Passage, in the Canadian islands, for the current ride of your life. Drift diving this narrow passage on a full tide can be a thrill as you cruise by lingcod, huge anemone-covered boulders and kelp beds. A boat waiting at the other end is an obvious necessity.

On the extreme northwest end of Galiano Island is Alcala Point, a great shore dive for intermediate and advanced divers. Just a few feet from shore there is a drop-off where basketstars occur in only 40 feet of water. Rock scallops, swimming scallops and huge baseball-sized barnacles make up a large portion of the filter feeding community. The bottom topography is made up of a series of rock ledges extending down to around 60 feet.

At the northeast entrance to Porlier Pass lies the wreck of *Del Norte* in 70 feet of water. This 190 foot sidewheel passen-

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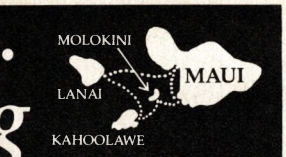

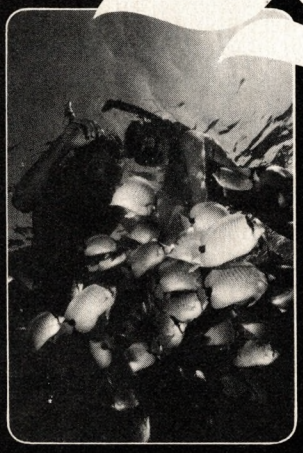

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Pacific Northwest

ger steamer went down on the rocks of the pass in 1868. While most of the ship's wreckage has been pretty well picked over, there are still some large parts of the vessel remaining. Swift currents make this a dive for the experienced only.

Moving south to the American San Juans, Turn Point on Stewart Island provides a favorite wall dive. Beginning right at the shoreline, the rock wall drops almost straight down to several hundred feet. One of the major features of this dive is the hundreds of huge plumose anemones that cover the wall.

Farther south off the northeast side of San Juan Island is Center Reef, a rocky pinnacle out in the middle of nowhere, constantly bathed in the nutrient-rich waters of the Pacific. Descending through the kelp bed attached to its top, one arrives at a rocky reef teeming with marine life. Every square inch of rock is covered with some form of living sea creature from coralline algae to bright red and purple brooding anemones.

On San Juan Island itself is Lime Kiln, a series of shallow to moderately deep rocky ledges beginning right on shore. Farther south sits San Juan County Park, a beautiful campground facility with a boat launch as well. Low Island is a small rock outcrop just out of the bay at the park about one-quarter mile offshore. It is home to abalone. Additional camping/diving accommodations can be found on James Island with protected boat moorage in the bay. Sucia Island provides the same type of accommodations.

PUGET SOUND

The waters of Puget Sound are truly different than those of the more northerly points mentioned above. The main difference is owing to the constriction at the head of the sound, near Admiralty Inlet, where an underwater sill rises to about 130 feet from the surface. This restricts the flow of clean open ocean water in and out of the sound. While the main basin of Puget Sound is as deep as 600 feet, it takes quite awhile for all of the water in the sound to get completely flushed out. As a result, the diversity of marine life is not quite as great as in the islands or along the strait. However, there does seem to be an abundance of edible marine life that thrives under these conditions and, in fact, the largest octopus in the world have been collected in lower Puget Sound.

While not in Puget Sound proper, the Keystone Jetty on the north end of Whidbey Island is considered by most a Puget Sound dive. Two dives exist here, one on

(Continued on Page 122)

Branford Dive Center

in the heart of Florida's freshwater springs

TEXT AND PHOTOGRAPHY BY STEVE LUCAS

The cypress trees along the river bank constantly leach their deep amber tannic dye into the water. Draped with Spanish moss, they let you know immediately you are in the depths of the South.

Watch the wide, lazy Suwannee River flow endlessly beneath their branches, listen to the wind and let your mind wander. You can almost hear the dueling of banjos and guitars somewhere upstream. And, the river can mesmerize you into believing you can see the river boat *Madison* on her way down to the gulf. Paddlewheels churn the coffee colored water; ladies in bright colors and bustled dresses rustle their petticoats; properly attired southern gentlemen talk about the encroaching Yankee army; and the captain, keeping a keen eye on the sandy shallows, daydreams of leading a southern militia.

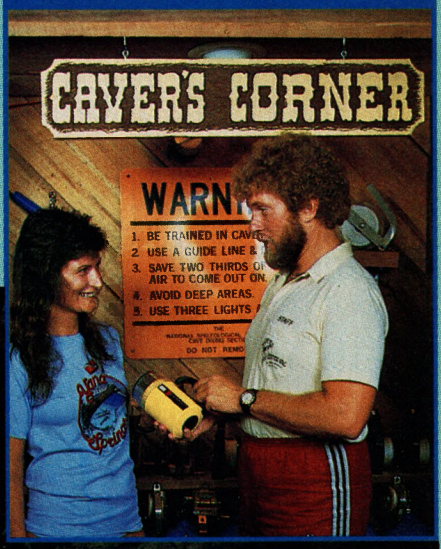
Thirty minutes from either of northern Florida's major highways—I-10 or I-75—Branford is hardly large enough to call itself a city. The municipal center has Town Hall posted over its door. There are a couple of small grocery stores and several restaurants, including the Second Stage Oyster Bar, which has a diver's regulator as its logo, and the Cove, which serves fresh river catfish and fried chicken. There is also a volunteer fire brigade and one police officer—the chief. This is not a place that would catch your eye on any map as a tourist destination.

Mayor Gene Broome, however, has a different way of looking at the potential of tourism for his town than have most of his predecessors. Mayor Broome is a diver and the owner of the Branford Dive Center, one of the hottest weekend dive destinations in the entire state.

Branford is right in the middle of the largest concentration of divable clear water springs in Florida. Although less than a dozen are regularly visited, there are more than 30 springs and sink holes, most offering visibilities over 200 feet, within a half hour of the town. What makes these places popular is their admission fee. With the exception of a small number of camping parks, all diving in this part of Florida is free!

The dive center, perched on the banks of the Suwannee in Branford's Ivy Memorial Park, is equipped to handle several hundred divers efficiently. Having an enormous quantity of stored high pres-

(Continued on Page 117)



Above: Branford Dive Center. Below: Gene Broome discusses dive lights and cavern diving. Bottom: Janice Lucas at Troy Springs.

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Key Largo's U/W Zoo Parade

TEXT AND PHOTOGRAPHY BY STEPHEN FRINK

There are more dive shops per capita in Key Largo, Florida, than anywhere else in the United States, owing to Pennekamp Park's status as one of recreational diving's most popular attractions. The dive community is cooperative, yet competitive. And, for Captain Slate's Atlantis Dive Center to have evolved into one of the area's best known and respected businesses in just seven years involved a combination of sound marketing, personalized attention to the needs of guests and a dedication to the fun inherent in diving as a sport.

Beginning with one dive boat and a storefront/marina near the north end of Pennekamp, Atlantis Dive Center has grown to include four boats, two retail centers and a staff of 16 to 20, including five instructors. The boats have been custom designed for divers. Three are 41 foot diesel vessels, U.S. Coast Guard certified for 40 passengers, and one is a 27 footer certified for 20 divers. The average group on the larger boats is 25 passengers or less and the smaller boat generally carries no more than 12 passengers. During the prime dive seasons these boats will be busy for both morning and afternoon two tank dive trips, as well as one or two tank night dives. One of the boats has been designed with integral underwater viewing ports so it can function as a glassbottom boat when necessary. In addition to the boat fleet and retail facilities, Atlantis Dive Center maintains a complete scuba gear rental inventory with more than 130 tanks and an extensive selection of regulators, BCs and snorkel gear. There are two 12 cfm air compressors with 30,000 cubic feet of storage to round out the physical attributes of the business. Perhaps more important to the continued growth of the enterprise is the enthusiasm and engaging personalites of the owners, Spencer and Amy Slate.

Captain Slate has gained prominence through his activities as national chairman of the YMCA scuba program and his involvement with PADI, NAUI and CMAS scuba instruction programs. But, it is probably his fish feeding antics that have garnered him the greatest fame. Barracuda and moray eels have become his specialty. He has a unique and bold style of feeding these marine predators—he holds baitfish in his mouth—that has thrilled countless divers. Even today, one of my more popular photos is one I shot nearly five years ago. It shows Spencer Slate holding a ballyhoo in his mouth as an especially massive barracuda snatches the bait with fangs extended. That image has been used for postcards, T-shirts, beach towels, drink insulators and even as the basis for an artist's rendering that appeared in the Sunday comic strip Ripley's Believe It or Not.

That particular barracuda lived on the wreck of the *City of Washington*, one of the more than two dozen dive sites regularly visited by the Atlantis dive boats. Other popular reefs and wrecks include the statue of Christ of the Abyss, the Elbow, Mike's Wreck, the Civil War Wreck, Carysfort Reef and the Minnow Caves. On request the itinerary can include a visit to the central and south ends of Pennekamp to dive French Reef or the *Benwood* wreck. Among these dive sites is an extended family of pets that has grown to include Melba and Perry, the resident green morays from the *City of Washington*; Lightning and Barbara, 'cuda from the Minnow Caves; Moses, the green moray from Mike's Wreck; Flash, the barracuda on the Elbow; Sundance, the green moray living near the Christ statue; and Smokey, the huge barracuda also living at the Christ of the Abyss statue.

Each of these animals is quite used to being hand (or mouth) fed and will enthusiastically swim up to visiting divers. While impressive, the encounter is quite safe. It is especially productive for underwater photographers as it allows close and casual access to exciting subjects. For divers fortunate enough to be entertained by Captain Slate or a member of the Atlantis staff, the fish feeding activities take on an element of an underwater circus. New members of the Atlantis fish family are constantly being groomed. Two recent discoveries with star potential are the spotted morays from the Civil War Wreck, Sarah and Slime.

In keeping with its concept of diver and marine creature interaction, Atlantis Dive Center is also a booking agent for Key Largo's Dolphin Encounter. In a program operated by dolphin trainers Lloyd and Rick Burguess, small groups of snorkelers are allowed in a holding pen with four Atlantic bottlenose dolphins to swim around, touch and actually be towed by these magnificent marine mammals. This is a program that is virtually independent of weather as it is conducted in a protected and enclosed canal.

Atlantis Dive Center has developed dive/lodging packages with several resort properties in Key Largo. It can offer economy to luxury accommodations, in each instance at a significant savings over booking the diving services and the room a la carte. Among the properties available as a package with a three day minimum stay are the Rock Reef Resort, the Anchorage and Howard Johnson's. Rock Reef offers individual cottages on a sand beach along the Florida Bay; the Anchorage features luxury condominiums and boat dockage for short term rental; and Howard Johnson's is a beautiful bayside property with a restaurant, lounge, swimming pool and some of the most magnificent sunsets in the Keys.

Divers on the Atlantis charter boats may take comfort in the requirement that all crew members must be CPR and first aid trained. Most of the staff are either divemasters or instructors as well. The emphasis on scuba education is evident and at any given time there is likely to be a specialty or a certification course in progress. Introductory scuba courses and guided dives are also available, the latter being recommended for divers who might be a little rusty in dive skills.

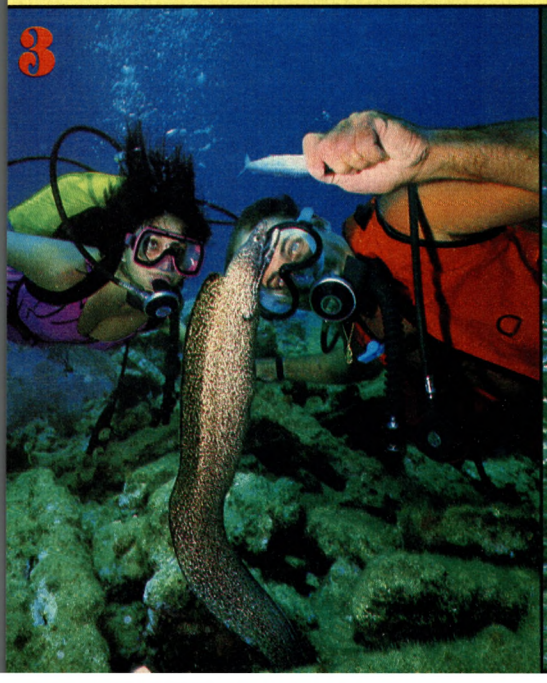
For further information or reservations, please contact Captain Slate's Atlantis Dive Center at (800) 331-DIVE or from Florida phones, (305) 451-1325. Mail inquiries may be directed to 51 Garden Cove Drive, Key Largo, FL 33037.

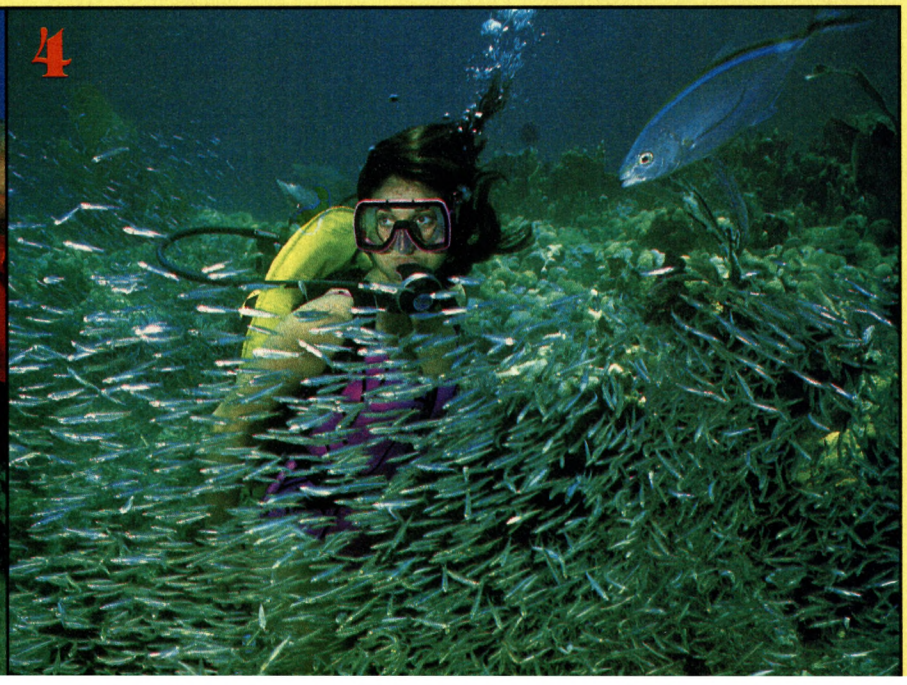
1 Captain Slate displays his unique method of feeding a barracuda. Feeding "dangerous" marine animals such as eels and 'cuda has become his specialty—and thrilled countless divers.

2 The Atlantis Dive Center offers four boats, two retail centers, a staff of 16 to 20 (including five instructors), two air compressors, 130 tanks and a complete inventory of rental gear.

3 Amy Slate observes her husband feeding Slime, one of the resident spotted morays on the Civil War Wreck. Such close encounters provide great photographic material for guests.

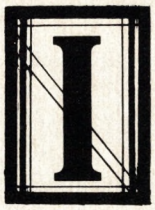
4 Swirling schools of silvery fry can be found at the Minnow Caves. Here, Amy Slate is nearly obscured by such a school—and a hungry bar jack moves in hoping to collect an easy meal.





Diving For Classic Clams

An East Coast Delicacy



BY DAVID F. DONAVEL

In New England they're quahogs. Further south they're hard shells and in other places they're known as hard clams, round clams and depending upon size, littlenecks and cherrystones. Regardless of what you call it, *Mercenaria mercenaria* is the same delicious clam from the Gulf of St. Lawrence to Florida.

Quahog (pronounced ko-hog) is the European version of a largely forgotten and probably unpronounceable combination of Narragansett Indian words meaning "dark" or "closed" and "shell" and the name celebrates the tightness with which these sturdy bivalves can "clam up." Adult quahogs are from four to five inches long and about four and one-quarter inches high. On the outside they are oval and gray, often stained brown or black. Their shells are solid and thick and, inside, white except at the siphonal end where they are deep purple. Near the hinge quahogs have a small, heart-shaped area where they are vulnerable to the knife of the clam shucker.

While *Mercenaria* is frequently found in silted or muddy intertidal zones, it thrives in water to 60 feet. Gathering clams in frequently worked shallows can be difficult, but chances are good the nearby deeper water holds a plentiful supply and here the diver has an unbeatable advantage. Swim slowly over the bottom paying special attention to areas more muddy than sandy. Quahogs live buried beneath the bottom to the length of their siphons. Fortunately these are relatively apparent once you know what you're looking for. Clam siphons appear as one inch diameter oval holes flush with the bottom—they are the ends of tubes the animal uses for filtering sea water. Once you've found one, look around carefully since *Mercenaria* usually live in groups. Large clams have long siphons; small clams like littlenecks have short ones, as their name implies. While small ones can easily be scooped up with your hand, larger ones require more subtle tactics. The easiest way down to larger clams is to fan away the few inches of sand until the clam is visible. The "dust storm" this kicks up will obscure nearby siphons so it's a good idea to spot a second clam while you fan your way down to the first. Once that's bagged, go for the second. Quahogs are plentiful all along the East Coast, grow quickly and live a long time, sometimes from 25-30 years. In addition, they oblige by remaining alive and fresh for weeks after being taken from the water, provided they're kept cold. Despite this remarkable durability, it's best to ice your catch and eat it the day of your dive.

Simple and humble as the quahog is, it has an illustrious history. Along with cod, clams helped sustain the first European settlers in America. Indians taught the Pilgrims how to collect and eat these bivalves and, presumably, those thrifty Puritans were delighted to discover the shells had a monetary value, especially those shells stained purple. The use of shells as money was not restricted to Indians. In the early days of colonization, a wealthy European might well have had a mix of gold guineas, purple wampum (quahog shells), white wampum (whelk shells), English shillings, Dutch guilders and Spanish pieces-of-eight in his purse. Moreover, purple wampum spread beyond the coastal areas. It was so valuable it served as money over the entire continent and that use is reflected in its Latin name, *Mercenaria*.

Today, the empty shells have lost their value, but full ones are still prized even by those not keen on most seafood. Clams to two inches are best eaten on the half shell with a little cocktail sauce or, more simply, with lemon juice alone. Opening the critters, however, can be a headache. Insert the tip of a stout knife into the small heart shaped area near the hinge. Firmly and carefully work the knife between the valves. Be patient and avoid slipping with the knife. Getting the feel for this operation may involve sacrificing a clam or two and patience will keep you out of the first aid kit. Once the blade has penetrated the shell, slip the knife around to cut the two adductor muscles. The clam will open easily. Take off the top shell and scoop the knife beneath the clam to cut the muscle holding the animal to the bottom shell. Serve the clams with crackers or bread and unsalted butter, with beer or white wine as beverage.

Chowder clams, the quahogs three inches and larger, tend to be too tough for eating on the half shell. This is especially true south of Cape Cod where, for some reason, these clams tend to be tougher anyway. Most people steam them open, cut out the meat and use them in a variety of ways ranging from simply dipping them in melted butter to a fancier and no less tasty clams casino. The quahog is also, of course, the main ingredient in everyone's clam chowder, a private version of which every East Coast diver should have.

Caution: Before you set out for the clamming area nearest you, be sure the water's not infested with a red tide, a bloom of a specific dinoflagellate. If it is, shellfish should be shunned until the area clears. Also, check town or state laws. Clams are protected in some areas and taking them without a permit can lead to unhappy confrontations with the local constable. These hurdles cleared, your clam gathering should be a pleasure, one surpassed only by the delights of your clam eating.

CHOWDER

Dice and fry a large onion and about four bacon slices until onion is translucent. Add two cups diced potatoes, cover with water and boil until potatoes are done. Add the ground meat and broth from about two dozen large clams. Add one quart of milk, pepper, then simmer, then thicken with a blend of one tablespoon flour and ¼ cup milk.

CLAMS CASINO

Mix ¼ pound melted butter, three crushed garlic cloves, one teaspoon lemon juice, one tablespoon chopped parsley, two tablespoons chopped chives. Set aside for several hours. Open 6-12 medium clams per person, lay one teaspoon of sauce onto each clam and cover with bacon. Broil about five minutes or until bacon crisps.

STUFFED QUAHOGS

Steam about six large clams per person and grind the meat. Add to it ¼ cup chopped celery, ¼ cup minced onion, ¼ cup green pepper, two cups fresh bread crumbs. Dampen with clam broth, mix, and fill 2-3 half shells per person with stuffing. Cover with ½ bacon slice and bake at 450°F until bacon crisps.

photos/Andrew Martinez

INTERNATIONAL SHARK SYMPOSIUM

Enthusiasts Reveal Some Surprising Discoveries

BY ELLSWORTH BOYD

photo/ Valerie Chase

How are your elasmobranchs doing? Are they getting enough oxygen? Do they have any lesions? Are they displayed aesthetically? Don't worry, I didn't know what elasmobranchs were either—until I heard someone mention "the great white elasmobranch." That's when I sat up and paid *real* close attention!

An audience of 200 elasmobranch enthusiasts listened to talks by 30 experts at a four day International Shark Symposium at the National Aquarium in Baltimore, Maryland. Billed as "Sharks—Recent Advances in Captive Biology," it drew the world's foremost authorities—researchers, curators and scientists—who discussed blue, lemon, bonnethead, blacktip, great white and other species of elasmobranchs.

Although elasmobranchs include sharks, stingrays and skates, sharks received the most attention in research studies, papers and slides presented by speakers whose knowledge was enlightening. Blue sharks, for instance, don't like to swim in circles; sharks are difficult to find in waters off England; sharks can get herpes; an underwater video system enables scientists to watch elasmobranchs mating; and the great white elasmobranch is a sluggish swimmer.

David Powell, Monterey Bay Aquarium, Monterey, California, recounted a history of sharks in captivity. He said, "The success of early pioneers in maintaining pelagic sharks at Marineland and Sea-

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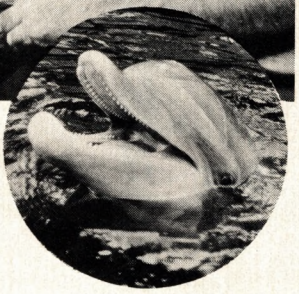

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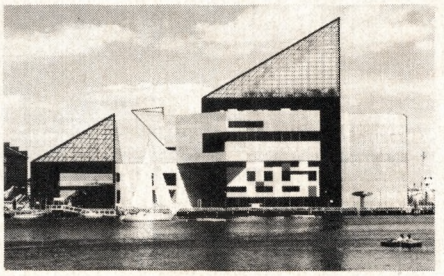
SHARK CONFERENCE

quarium depended upon hardy species and very short transport times. The stress of capture and transport was severe and the walking of traumatized sharks was common practice." Powell explained how the shape of an aquarium affects certain species. "Blue sharks," he said, "like to swim in straight lines; therefore a circular tank is bad for them. Their energy reserve is in their liver and if they expend too much energy swimming in circles, they incur liver ailments." A diver in the audience quipped, "If I'm ever chased by a blue shark, I'll swim in circles and give him a liver affliction!"

Ian Cunningham, a diver and curator from Sea Life Centre, Weymouth, Dorset,



National Aquarium in Baltimore.

United Kingdom, isn't worried about encounters with blues. He smiled and said, "How can you place a blue shark in captivity when you can't even find one?" The blue is supposed to be a regular visitor along the southwest coast of the United Kingdom, while making an occasional appearance in northern parts of the North Sea. Cunningham said, "Using mackerel for bait, we fished for blues three days without a bite. We finally found some three to four footers off Cornwall and managed to land one. But the journey back to Weymouth was four hours and our specimen died. We're optimistic about the future, however, and plan to return again soon for another go at it."

Even in captivity, sharks are subject to injury and disease. According to Louis Leibovitz, Marine Lab, Woods Hole, Massachusetts, over 50 percent of sharks have skin lesions, but they are not serious. Some are susceptible to a viral dermatitis called herpes and to a "fouling of the skin," infections and other microscopic skin disorders. Leibovitz, a doctor of veterinary medicine, has spent four years studying skin diseases of sharks. He has added much to the knowledge in this area.

Sex discoveries are important too, according to Leo Demski, University of Kentucky and Gulf Coast Research Lab, Ocean Springs, Mississippi. Demski uses his own underwater video system that provides an intimate profile of love among elasmobranchs. Demski explained that elasmobranchs have large brains, surpassing some birds and mam-

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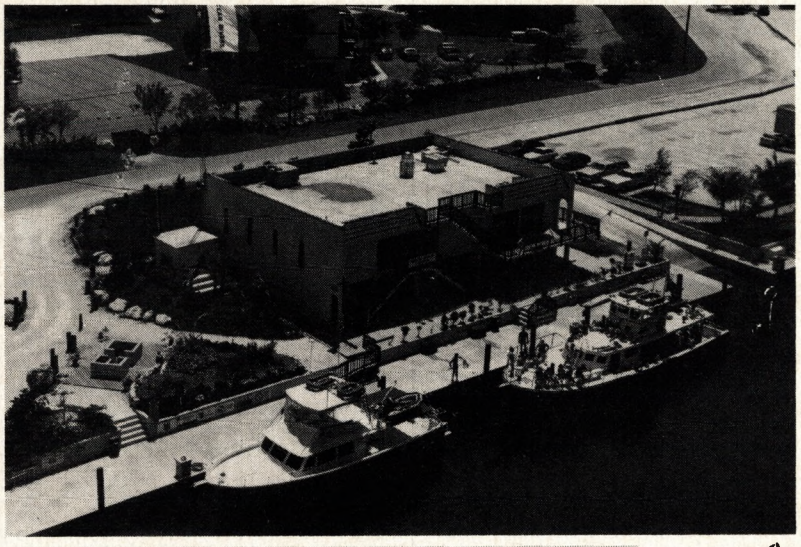

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mals in brain-body ratios. They also have complex modes of reproduction that include internal fertilization, prolonged fetal development and elaborate social behaviors. His studies may provide useful information for induction of breeding in captivity. He tells an interesting story about divers versus hook-and-liners in capturing rays and horn sharks. "It was a friendly little contest," Demski said. "We hooked some elasmobranchs topside while divers captured some below by hand. The object was to see which would survive best in captivity. The divers won; their specimens endured less damage in handling and transfer to the aquarium. I think diving is an extremely useful approach and I plan to use more divers in the future for field work."

A recently captured, ten foot tiger shark is walked by divers in order to force water through its gills and revive it. According to Jackson Andrews, curator of the National Aquarium in Baltimore, "The circulatory system of sharks is very delicate. They need oxygen ... and constant changes of water while being transported." Thirty experts offered a variety of insights into these fish at the International Shark Symposium.

Not long removed from recent field work with the great white elasmobranch in Australia, John Hewitt, Steinhart Aquarium, San Francisco, revealed some astonishing discoveries. The great white, in comparison to other sharks, is a relatively slow swimmer. It cruises at less than a mile an hour and rarely moves more than three miles an hour. A good swimmer can stroke four miles an hour. Compared to the blue shark's speed, grace and ability to turn on a dime, the great white is somewhat slow and awkward. But the great white possesses other attributes that enable it to maintain respectable social standing in its community and a mixed, love-hate relationship with divers and swimmers.

"While conducting research in Australia," Hewitt explained, "we attached speedometers to the great white's skin, then tracked it with an ultrasound transmitter. We concluded that great whites don't move very fast because they want to conserve energy. This fits our conclusions from studies in captivity—the little bit we've done because nobody has been able to keep one more than 16 days. The great white cruises slowly and speeds up only when hunting or avoiding attack. The element of surprise is part of its predatory feeding behavior. It remains patient in stalking an animal, then normally sneaks up from below or behind, takes a bite, then moves off. The animal dies

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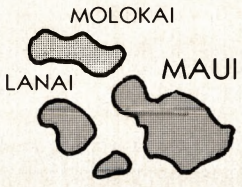

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SHARK CONFERENCE

and ten minutes or so later the shark reappears to finish it off. We call this an energy conservation pattern."

Hewitt has done research on the biology and behavior of the great white shark for ten years, gaining valuable insight into its needs in captivity. He has developed a technique for reviving the great white in captivity through intensive care similar to that used on human heart attack victims. He was responsible for helping to keep a great white alive for 16 days, a record to date. There are none in captivity at the present time.

"It's a *Catch-22* situation," Hewitt explained. "We know relatively little about the great white and without one in captivity, it's difficult to learn a lot more. In addition, aquarium management must make a big commitment if they decide to try and keep one. The institution needs a large display tank and additional manpower to handle and study the species. But there certainly will be an element of pride involved for the first aquarium that successfully keeps and displays a great white in captivity."

Another drawback in landing a great white is that one comes along in about every four weeks of hard fishing. Hewitt and the Steinhart staff members don't even try to catch one anymore. They keep a boat in the Farallons, Tomales Bay and Bodega Bay areas north of San Francisco, hoping the halibut gill net fishermen will bring one in as they've done in the past.

Large concentrations of great whites have been spotted north of San Francisco to Point Conception, where there has been interaction with humans. "Tell divers to use common sense," Hewitt advises. "If great whites have been spotted in certain areas in recent days, simply don't dive there. Great whites feed on mammals—seals and sea lions in particular. These pinnipeds have multiplied rapidly and are no longer an endangered species. Increased numbers have drawn more great white sharks and chances for mistaken identity are greater now than ever before.

"Free divers searching for abalone," Hewitt added, "mimic the behavior of a seal. They resemble a seal; so do surfers on short boards. Turbulent waters don't add to the safety factor either. On a happier note, scuba divers are not as susceptible to attack because they are deeper and their apparatus does not resemble a seal."

Although Hewitt's great white shark study captured the fancy of elasmobranch enthusiasts, other speakers injected interesting information and anecdotes. Jack Casey, field biologist with the National Marine Fisheries Service, has captured and tagged 55,000 sharks dur-

(Continued on Page 121)

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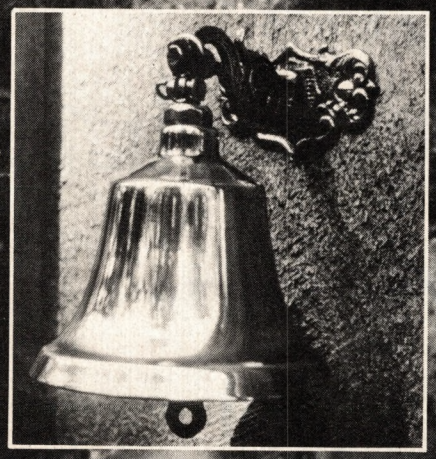
The Diver's Eye

Finding Shipwreck Relics Takes The "Right Look"

TEXT AND PHOTOGRAPHY
BY BRIAN J. SKERRY



Above: The dinner bell of the *Herbert* as it appeared on-site—partially buried and covered with marine growth. Left: The *Herbert*'s bell after cleaning. The artifact diver must notice unusual shapes, such as straight edges, which indicate manmade objects. Then he/she must visualize what the object will look like when restored.

Wreck diving: submerging yourself for a chance at finding what Indiana Jones would call "fortune and glory." Although few wreck divers ever find fortune and glory, many have found treasure—not necessarily treasure in the traditional sense, such as gold jewelry or pieces of eight, but more along the lines of brass telegraphs, wooden dead-eyes or even the ship's dinnerware.

Though not as flamboyant as silver and gold, artifacts such as those mentioned, and the countless others that can be found on shipwrecks, are just as prized by their finders. And, in spite of the occa-

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sional diver who drops his grappling hook right on the binnacle, for the most part, finding these artifacts requires quite a bit of skill.

Since shipwrecks rarely give up their secrets easily, the most important tool is a keen eye. By covering its victims with everything from kelp to coral, the sea can camouflage objects that would otherwise be in plain sight.

Finding things on wrecks that are no longer intact is even harder, as you have few, if any, reference points to go by. When searching for artifacts, I've found there are three basic steps that can be used to increase your chances of success. The first one is sighting the object and, as previously mentioned, requires a keen eye. Nature almost never produces perfectly straight, sharp or angled objects as does man using tools, so it is important to look for shapes that are a little too perfect. Even when covered with growth the shapes can usually be discerned by a careful eye.

The second step is imagining the object. When looking through the wreckage you often have to complete the picture. Since many artifacts are partially buried either in wreckage, mud or whatever, when something catches your eye you have to try to imagine what the rest of it might look like or what it might have been used for. This is when a knowledge of vessel types and ship construction comes in very handy. Using this technique, even wrong guesses have produced some nice finds. I can recall working on a piece I first thought to be a pipe leading to a gauge, only to find after a little more effort that I was working on the handle of the ship's telegraph. Of course, no one has to know you ever made a wrong guess.

Once you think you've found something worthwhile, you have to try to determine what it is made of. Artifacts of glass, pottery or even wood are easy enough to identify but metallic items require an extra step. There are many items on shipwrecks made of iron or steel and after being underwater for a period of time just aren't worth the effort of taking back and preserving. Brass, copper or bronze are much more sought after owing to their monetary value, resistance to corrosion and their facility for preservation.

Making this determination is the third step, which I call feel, and can be done quite simply by striking the object with a hammer (a mason's chipping hammer is the most versatile for this type of work). When struck with the hammer, iron objects have a soft, almost mushy feel, very different from the solid, hard feel that brass has. So as not to damage the piece, only a moderate tap is necessary.

By being alert, going slow and using these steps, your chances should be pretty good. And who knows, with a little luck you just might find a little "fortune and glory."

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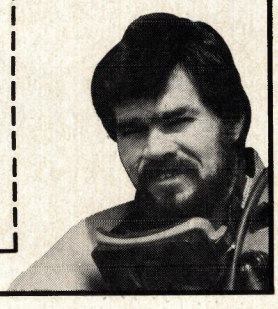

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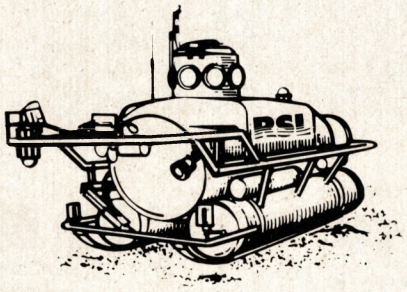

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THE GENERAL BUTLER

Champlain Maritime Society Studies a Classic Shipwreck

TEXT AND PHOTOGRAPHY BY RUSS BELLICO

Lake Champlain, an inland sea that stretches 120 miles along the borders of New York, Vermont and Canada, is a watery time capsule of more than 200 years of military and commercial history. To those who have been on the lake, nothing surpasses the sight of its rocky shores with the majestic Adirondack Mountains on one side and the distant Green Mountains on the other rising out of the vast blue-green water. The scenery along the lake changes markedly from a narrow river-like body of water lined with farms along the flatlands in the south to its maximum 12 mile width in the mountainous north.

In recent years a flurry of interest in the lake, spearheaded by the Champlain Maritime Society, has brought forth more than a half-dozen wrecks, many virtually intact. The CMS, a non-profit organization, was founded in 1979 by divers, historians, archaeologists and others interested in preserving the maritime heritage of the lake. The inclusion in the society of professional as well as avocational

groups has made a unique contribution to the discovery and preservation of the varied ships that once traversed the lake.

Many wrecks discovered in the last five years are related to the extensive commercial activity of the lake especially after the Champlain canal connected the lake to the Hudson River in the early 19th century. It was in this era that sailing canal boats carrying iron ore, lumber, marble, graphite and other bulk cargo plied the waters of Lake Champlain. By 1857 more than 300 sail and canal boats were registered on the lake while others made their

(Continued on Page 104)

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GENERAL BUTLER

(Continued from Page 100)

home ports along the Hudson. Many of the canal boats were rigged as schooners and sloops. The maximum size of these vessels was dictated by the smallest lock in the canal network. The masts would be taken down when the vessel entered the canal in order to pass under low bridges. Along the canal the boat would be pulled by mules, but out of the canal it would sail between the ports of Burlington, Essex, Plattsburg, Vergennes, Westport and Whitehall.

The most accessible and interesting sailing canal vessel wreck is the *General Butler*, an 88 foot canal schooner built in Essex in 1862 and named after the Civil War general, Benjamin F. Butler. The vessel was sailing with a load of marble from Isle LaMotte (northern part of the lake) to Burlington, Vermont when a vicious winter storm arose. Battling ten foot seas on December 9, 1876, the *Butler* twisted and crashed through the icy waves. As the vessel approached the harbor, the foremast was broken off and both the storm anchor and steering wheel were lost. In a desperate attempt to save the vessel, William Montgomery, an experienced captain on the lake, jury-rigged the steering mechanism (chained the rudder post to a tiller handle). The effort was of no avail as the bow repeatedly smashed into Burlington's breakwater. The passengers, crew and Montgomery leaped to the frigid, rocky breakwater. The seven survivors were later rescued by a local resident and his son in a small open boat, but the *Butler* sank.

Today, the schooner lies in 40 feet of water, approximately 150-200 feet west of the southernmost vertex of the V-configuration in the breakwater. The vessel, lying in an east-west direction, was discovered in 1980 by two students, Dean Russell and Scott McDonald, using information provided by Lake Champlain historians Peter Barranco and Merritt Carpenter, board members of the CMS. Presently, the vessel is completely intact including the entire hull, decking, hatches, cleats, deadeyes, windlass, mast supports, iron cookstove and the jury-rigged tiller bar.

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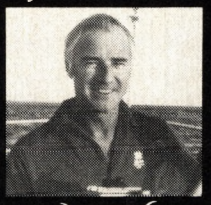

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GENERAL BUTLER

tion, the Champlain Maritime Society was issued a permit for an initial study of the vessel that included the recovery of more than 100 artifacts. Under the direction of Arthur Cohn, vice-chairman and underwater projects supervisor for the CMS, and with the help of many volunteers, including underwater archaeologists William Bayreuther and Kevin Crisman from Texas A & M, the society was able to complete a detailed study during 1981 and 1982 of the construction of the vessel. The artifacts recovered included crockery, pots, bottles, a woman's dress, Royal Stone China from Glasgow and a 25 inch wooden ship model. These items were preserved and are now displayed in the Colchester Reef Lighthouse at the Shelburne Museum south of Burlington. Monty Fischer, chairman of the CMS, also heads the museum committee responsible for displaying the Champlain artifacts. He hopes to open a second museum exhibiting items from other vessels at a location farther down the lake.

In 1982 an airlift was used to remove some of the mud inside the ship and to partially expose the keel from the outside. As a result of the airlift operation, a study of the frames, centerboard box, floors, etc. was much easier. This has also made the wreck more interesting for visiting sport divers. The *General Butler* has provided an important opportunity to study a unique hybrid type of vessel that may have been indigenous to the Lake Champlain region. Between 1814 and 1870, the shipyards of Essex, NY alone produced 52 sailing canal boats in addition to the *Butler*. The design of the vessel differs from an ordinary canal boat in a number of ways. Besides having sails, the *Butler* had a drop centerboard and a molded bow and stern that created a more rounded appearance.

Many sport divers have now visited the wreck. Northern Divers of Burlington offers charters to the sunken craft each Wednesday. Other divers have found the vessel on their own, especially when there was a temporary buoy tied to a cement slab that was then tied to the bow of the wreck in the summer of 1984.

The *Butler* provides an almost Hollywood version of a shipwreck for divers. As one descends the blue-green depths, a feeling of eerie nothingness transpires until suddenly, the *Butler* seems to spring out of nowhere. The wooden ship sits there as if it sank yesterday, yet it has been resting on the bottom for over 108 years. The wreck has become a haven for rock bass, perch, walleye and even the elusive northern pike. It's amazing to see something this old in such perfect condition. As you swim past the large windlass to the first mast support or tab-

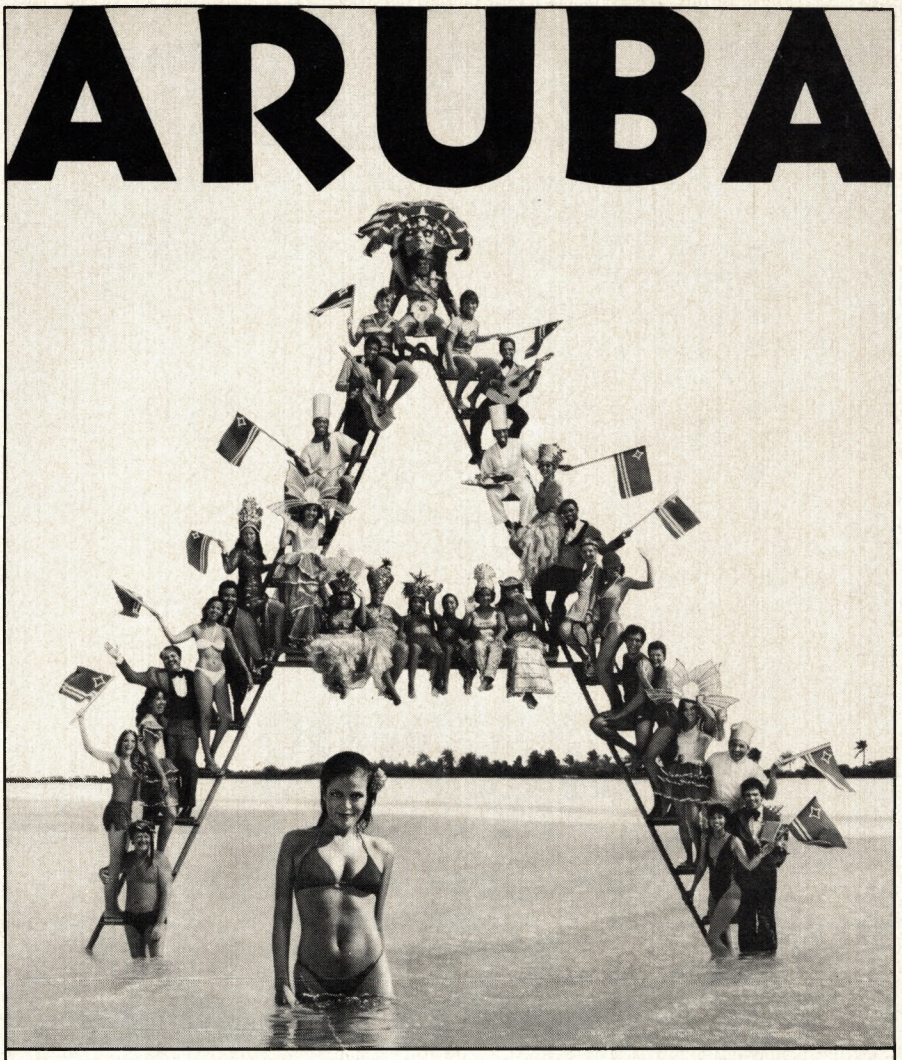
ernacle, you observe some of the perfectly preserved deadeyes still attached to the gunwale.

There are five hatches on the deck of the *Butler*. The first one in the bow is very small, but the next three are good size cargo hatches. The fifth and largest hatch is in the stern. Before the ship sank there was a two or three foot high roof or deckhouse over this hatch. This was the main cabin on the vessel and allowed the crew to stand fully upright. Most cabins on similar vessels had three small windows on each side, but there is no evidence of that now. However, the roof of the cabin still lies on the vessel, partially covering the third hatch from the bow.

The *Butler* can be entered most easily from the aft hatch since it is approximately seven by eight feet. Penetrating the hull should only be done by experienced divers with safety lines recommended. Since silting occurs as divers swim inside the hull, one could easily become disoriented. This is especially the case when large numbers of divers visit the wreck and drop through the open hatches. As you enter the aft cabin you can observe the crew's iron stove lying on its side and a stringer from the broken stairway. Four stern windows are visible as schools of fish quietly behold intruders. Inside the vessel the marble cargo is still systematically stacked as if awaiting unloading at the Burlington dock. The next three cargo hatches are adequate exits, but the bow hatch is too small for a diver to fit through. The CMS advises visiting divers not to enter the hull for their own safety.

Back on the deck in the stern, the chain that was temporarily rigged to a tiller handle when the steering wheel was lost is still there. The fish are especially abundant around the steering mechanism. Down over the stern the large, exposed rudder can be observed. Further airlift operations by the CMS may expose more of the outside hull in the future.

One result of the *Butler* is the heightened awareness of the public to the archaeological significance of the vessels in Lake Champlain. This especially has been the case with local sport divers. One of the goals of the Champlain Maritime Society is the development of an underwater park for historic wreck sites such as the *General Butler*. This would involve a permanent buoy tied to a concrete slab near the wreck with signs indicating its historic significance and warning against relic hunting and the dangers of interior penetration. This would allow easy location of the wreck for sport divers yet protect the site from destruction from souvenir hunters. The buoy would also protect the vessel from damage when divers drag anchor to locate the wreck. What needs to be recognized by sport divers is that the artifacts that remain on Lake Champlain wrecks such as the *Butler* are not there because you are the first to discover them, but because they have been left there purposely for fu-



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GENERAL BUTLER

ture divers to see and enjoy. If we are going to continue enjoying sport diving in areas like Lake Champlain where the most interesting sights are shipwrecks, then we must begin to preserve these finite resources.

In a sense the *General Butler* has been an experiment since items such as deadeyes, cleats, etc. were left on the wreck. The only item taken was the anchor. After major news stories, including Burlington television coverage, about the illegal removal, the anchor was deposited within three days at the city hall during the middle of the night.

The *Butler* has been only one of about nine projects undertaken by the CMS in conjunction with the Vermont Division for Historic Preservation headed by Giovanna Peebles. The Vermont matching funding with the assistance of the U.S. Department of Interior has provided a unique program that has achieved goals of historic preservation, yet met the needs of sport divers in enjoying the underwater resources in the state. The Vermont program was recognized as one of "The Best in State Historic Shipwreck Programs" at the Conference on Underwater Archaeology held in Boston in January 1985.

ROESSLER/SEE & SEA TO NEW GUINEA

Carl Roessler will escort a See & Sea dive cruise to the Hermit and Ninigo Islands off Papua New Guinea March 7-21, 1986. The cruise will be aboard the Australian dive boat, *Reef Explorer*. Land touring in New Guinea can be arranged to supplement the cruise.

For further information contact See & Sea Travel, Inc., 680 Beach Street, Suite 340, San Francisco, CA 94109; (415) 771-0077; Telex 178036 SEAS UR, or call the Dive Experts at (800) DIV-XPRT.

TURNEFFE DIVING LODGE

Turneffe Diving Lodge at Caye Bokel in Belize has a new 38 foot Delta custom dive boat, the *Grand Slam*. Powered by twin diesels and capable of speeds in excess of 22 mph, it is equipped with full electronics—autopilot, Loran C, RDF, UHF, depth recorders, stereo and air-conditioning. It sleeps six and has a microwave oven, refrigerator, freshwater showers in the heads, cutaway transom, double ladder, extra large dive platform and tank racks. Equipped for either day or overnight trips, it covers the entire coast of Belize's great Barrier Reef.

For information, please contact P.O. Box 480, Belize City, Belize, Central America.

ADVENTURE DIVERS

Adventure Divers has opened in Fort Lauderdale—the only full service NAUI Pro Facility in Broward County, Florida. According to Capt. Sam Rich, Adventure Divers is "responsible for instruction on a basic and open water level for the cities of Fort Lauderdale and Plantation, the adult education programs of the Broward County Schools and the U.S. Coast Guard Station in Fort Lauderdale."

Offering training from basic through assistant instructor, all NAUI specialty courses are taught with special emphasis on deep and wreck diving, rescue diver and underwater photography. Along with Orbit Marine, Adventure Divers serves as sponsor of the Broward County NAUI Dive Club.

With its own charter vessel, the *Adventurer*, the store offers charters from Key West to West Palm Beach, running regularly to the *Mercedes*, *Trio Bravo* and other wrecks.

For information contact Capt. Sam Rich, Adventure Divers, 923 S.E. 20th St., Fort Lauderdale, FL 33316; (305) 523-8354.

TROPIC BIRD MOORINGS

In a continuing effort to protect the ecological resources of the British Virgin Islands, *Tropic Bird* has expanded its list of permanent mooring sites. With this system, a boat anchors at the site by hooking its mooring line to a float attached to an anchor on the ocean floor. *Tropic Bird's* captain, Mike Bloss, indicated he has been following the lead of several area seamen in a voluntary program to protect the precious underwater landscape. Bloss has been educating other boat and ship owners and encouraging them to cooperate in this program.

One week cruises aboard the *Tropic Bird*, with unlimited diving, are available throughout the year. For information call Scuba Tours at (800) 526-1394 or (201) 256-9115 in New Jersey.

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CoCo View Resort, Roatan, Honduras Bay Islands, is offering a new seven night dive package that combines three days and nights of live-aboard boat diving with four nights of resort-based diving and accommodations. The new Surf-N-Turf dive tour features *Reef Runner*, CoCo View's new 43 foot, compressor equipped, power/sail, live-aboard boat. As an introductory special, groups of six or more scheduling a Surf-N-Turf tour to be completed before October 31 will receive a complimentary pass for one additional diver. As with all CoCo View dive packages, meals and diving are included.

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THE SINKING OF THE STEAMER WETMORE

TEXT AND PHOTOGRAPHY BY JIM KOZMIK

November is a month that haunts many mariners who travel the Great Lakes. During the late 1800s, several schooners, steamers and tugboats were lost in terrifying November snowstorms. Each weathered sailor had witnessed his share of wrecks and lost crew and, very likely, had been a lucky survivor of more than one such horrible incident himself. The threat to life was great in the mountainous waves and icy waters. Nevertheless, the season's last shipment of basic foodstuffs such as corn and flour was needed by the frontier settlers.

On the evening of November 28, 1901 an incredible event took place. During a particularly savage blizzard, the steamer *Wetmore* added yet another chapter to the history of the Great Lakes. Three vessels, all attached, piled up on the northwest shoals of Russell Island near Tobermory without a single life being sacrificed. The 72 meter steamer, *Wetmore*, settled her 700 tons solidly on the shoal while the crew struggled to reach the shore and wait out the night. The thick beams began to buckle and then snap, aged as they were by 30 years of service at sea. The stern had been drawn over the shallows by the weight of the schooners she had in tow.

The *King*, loaded down with lumber, had broken her tow cradle and was poised helplessly on the rocks, at the mercy of the southwesterly wind that was beating her to pieces. Broken now into large sections, she began to settle over the ledge into 30 meters of water.

The other schooner, the *Brunette*, was more fortunate, for she managed to nudge herself into a small cove and was pulled free the next morning—although, by that time, most of her cargo was lost.

Today the *Wetmore* rests in two to eight meters of water between the rock ledges that caused the old steamer to split open revealing its shaft and boilers. The site is buoyed by Fathom Five Park so charter boats may moor. The 13 meter charter boat, *Penguin Diver*, requires only 18 minutes to reach the site. The utmost care must be taken owing to the open area and northeasterly winds that often render the *Wetmore* undiyable. On calm days, before 11:00 am, the four meter high boiler can be seen from a dive boat. It rises one meter above the surface of the water. The boiler metal is clean and its markings distinct.

Below, large steampipes are scattered

about, with the shaft running to the shoals. Within two meters of the surface, the shaft block and propeller can also be seen easily from the surface. One propeller blade is broken; next to it lies the rudder, still intact. Large gears and pumps lie in their original structural position. If you swim in a northeasterly direction from the site, approximately 60 meters away, you will encounter the usual sections of wooden decking with their exposed ribs. Very near what was once the steamer's bow, three tons of anchor chain, still tightly coiled, stand a full meter

Near what was the *Wetmore*'s bow divers will find three tons of coiled anchor chain.

off the rock. Schools of suckers and small fry frequent the crevices deep within the hulk.

If you still have a little air left, snorkel over to the remains of the *King*. This area is clearly identified by heavy steel cables that run from the *Wetmore* to the north rock. The ledge forms steps downward and much is visible within the nine meters of water there.

Russell Island has claimed at least seven permanent wrecks along the north and east shores. The tiny island is approximately two and one-half kilometers from Tobermory Harbour and can be reached in minutes. The famous *La Salles Griffon*, the first large vessel to sail the Great Lakes in the late 1600s, is said to have been wrecked off the eastern edge of Russell Island.

Thousands of Canadian and American divers visit Russell Island and the site of the *Wetmore* yearly to enjoy the majestic remains of Canada's yesteryears.

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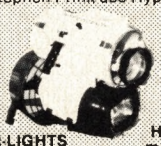

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AQUA ADVENTURES/ CURACAO PACKAGE

Aqua Adventures, the scuba tour operator, is offering dive vacation packages to the new Curacao Underwater National Park on the island of Curacao in the Dutch Antilles. Four and seven night packages are featured at the luxury Concord Resort & Casino. The property includes seven restaurants and lounges, a supper club, live entertainment and the largest casino in the Caribbean.

All packages include ocean view accommodations with terrace, diving, welcome cocktail, taxes/tips, tennis, chaise lounge and towel at pool/beach and a casino chip.

For further details and reservations contact the New York based operator: Aqua Adventures, Inc., 318 Lexington Avenue, New York, NY 10016; (212) 686-6210.

CLARK/LA MER/SEA OF CORTEZ

La Mer Diving Seafari, Inc., of New York is offering its third expedition to the Sea of Cortez with marine biologist Dr. Eugenie Clark, November 4-15. Fourteen participants will join Dr. Clark and focus on the behavioral studies of the myriad plankton-eaters found in the Sea of Cortez including manta rays and, with a bit of luck, the elusive whale shark. Dr. Clark also wishes to introduce the group to the hundreds of schooling hammerhead sharks she encountered on her last two La Mer expeditions here.

The expedition includes ten days of unlimited diving on board the 80 foot *Don Jose*. The vessel is fully equipped for diving with two compressors, aluminum air tanks, diving platform and dinghies.

For further information, contact Amos Nachoum at (800) DIVE-NOW or in New York, (212) 599-0886.

TREASURE CAY DIVERS

Treasure Cay Divers, an affiliate of Gulf Stream Pacific Airways, has opened a new dive facility at Treasure Cay Hotel and Villas on Abaco Island, Bahamas. NAUI instructors Jim and Carol Beights and NAUI/PADI instructor Joel Pratt will be the directors of the operation.

Treasure Cay Hotel and Villas, on 1,500 acres, has air-conditioned rooms with cable TV, a wide white sand beach and five freshwater swimming pools.

The newly renovated dive shop has a 17.5 cfm, 5,000 psi, electrically powered compressor, plus a backup gas powered compressor. New equipment includes 70 aluminum 72 tanks, 20 jacket BCs and 20 regulators with pressure gauges. Masks, snorkels and fins are also available. A 30 foot, 24 passenger Ocean Master dive

boat has been delivered and a brand new, 30 foot Island Hopper 25 passenger custom designed dive boat has been ordered and should be delivered soon.

Vacations at Treasure Cay will be available in eight day/seven night, four day/three night and three day/two night packages that will include roundtrip air fare from Fort Lauderdale via Gulf Stream Pacific Airways; double occupancy in an air-conditioned room with cable TV; all diving including weights, tanks, boat and dive guide; and complimentary golf, tennis and Sunfish sailboats. MAP is available. Not included in the package are transfers and U.S. and Bahamian departure tax.

Snorkeling excursions, shopping and sightseeing at Treasure Cay's charming old fishing village (circa 1783) are available for non-divers.

Authorized travel agents/dive shops/clubs will receive full commissions and groups are also commissionable.

For more information call Treasure Cay Divers toll free at (800) 228-9107 or in Florida at (305) 763-5665.

CENTRAL PACIFIC DIVERS

Central Pacific Divers now offers a full line of courses and related services in underwater photography. A two day introductory program, four day certification course, one day seminars, personalized in-water photo coaching and photo buddy services are now being offered as well as camera repair and rentals. These full service courses are open to all certified divers. No photography background is necessary for the entry level programs and use of all underwater photography equipment is provided.

Further information is available from Central Pacific Divers, 780 Front Street, Lahaina, Maui, HI 96761, or by calling (808) 661-8718.

PORT LARGO RESORT

Port Largo Resort in Pennekamp Park, Florida, is expanding to better serve its clients. Forty-eight more rooms and suites are scheduled for completion on February 1, 1986. All of the new rooms and suites are smaller than the two bedroom, two bath suites currently offered, yet they are intended to provide luxurious accommodations. Each new room or suite will have a waterfront view of Port Largo's yacht basin.

Additionally, Coconuts, Port Largo Resort's waterfront lounge, is being moved to a separate facility. A meeting room will be available for groups of less than 50 in the new facility.

Port Largo Resort has also added a Florida toll free line to facilitate reservations for its clients. The number is (800) 253-3483.

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Underwater Life Support Systems are potentially dangerous to a non-trained user. These include scuba tanks, regulators and buoyancy compensators. This does not constitute an offer to sell these items via mail order.

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CO STAFF

Two new staff members have joined College of Oceaneering, Wilmington, California. Todd Johnson is an assistant counselor. He spent the last seven years in the education industry in marketing and as a manager and administrator. He will advise prospective students about opportunities in commercial diving.

Steve Arrington is an instructor. He has an extensive background in the Navy, including explosive ordnance disposal and CPR. He has been a NAUI instructor for 13 years.

FUJI 100 PRO D (RDP)

(Continued from Page 47)

used) to reduce strobe output and he set the aperture for the sunlight exposure. The objective was to see how RDP would record the blue water background, bright colors and reflective fish.

Changing to a 28 mm lens, Jim took some head and shoulder shots of filefish peering into Cathy's facemask. Jim exposed at f11 with manual exposure control and full power with a single SB-103 with diffuser at two apparent feet. The objective was to see how RDP would record Cathy's skin tones and a darker (underexposed) blue background.

At Truk Lagoon, we took several pictures of the lush marine life growing on and around the mast of the *Fujikawa Maru*. The f8 aperture was set for the blue background, the film speed dial was set for double the ISO film speed and the single SB-103 (with diffuser) was set for TTL. The objective was to see how RDP would handle multi-colored subjects.

We ended with wide angle close-up photography. With the 15 mm lens set for one foot (minimum), the aperture for f16 and the strobe for full power (manual exposure control), we took pictures of leather corals on the *Fujikawa*. The upward angle gave a blue background and the strobe was aimed down from above the camera. The objective was to see how true the colors of the corals would be.

OUR TEST RESULTS

We were pleasantly surprised with the sharp, crisp, bright images Professional Fujichrome 100 D (RDP) produced. This new Fujichrome is much superior to the Fujichromes of a few years ago.

Jim's Hawaii slides showed excellent blue backgrounds and bright colors. He was especially pleased to see that the bright, reflective lemon butterflyfish didn't overexpose easily. Cathy's skin tones in the 28 mm portraits had a slight suntanned appearance. The slides of the colorful growth on the mast of the *Fujikawa* were exceptionally sharp and colorful, as were Jim's wide angle close-ups.

We believe RDP enhances yellow.

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FUJI 100 PRO D (RDP)

Thus, Cathy's yellow wetsuit and mask trim and the yellow corals and fish appeared bright and had excellent color saturation. The orange sponges and cup corals on the *Fujikawa* really stood out. On medium distance shots with strobe fill, the near shadow areas were slightly yellow-green rather than blue. This increased the contrast between these shadow areas and the blue background and added more depth to the pictures. We were pleased with these slides. As for the RDP's compatibility with photomechanical reproduction, look at the colors in this article and judge for yourself.

Fujichrome 100 D RDP is available from professional stock houses. For a list of these dealers write to: Professional Products Dept., Fuji Photo Film, Inc., 350 Fifth Ave., New York, NY 10001.

U/W SHOPPING CART RACES

Hydro-Space Divers Association of Vallejo, CA, recently sponsored an underwater shopping cart race and seafood festival at the Cunningham Aquatic Complex. Pairs of divers raced shopping carts from the shallow end of the pool to the deep end and then back again (one diver in the cart, one pushing). Prizes for the

winners included wetsuits, backpacks and dive lights. The seafood festival featured fish and abalone.

More than 250 people attended the event, which will be held again next year. For information contact Hydro-Space Dive Shop and Scuba School, 4345 Sonoma Blvd., #D-2, Vallejo, CA 94590.

SEA AGGRESSOR/ FREEPORT

The live-aboard dive boat, *Sea Aggressor*, will operate out of Freeport, Bahamas, September through March. Divers and groups wanting to probe outward from Freeport to the outer Bahamas will find this an ideal cruise.

For individual or group bookings contact See & Sea Travel, Inc., 680 Beach Street, Suite 340, San Francisco, CA 94109; (415) 771-0077; Telex 278036 SEAS UR or call the Dive Experts at (800) DIV-XPRT.

BRANFORD

(Continued from Page 83)

sure air (over 24,000 cubic feet) and a compressor capable of filling a tank in under a minute and a half, as well as a complete repair, rental and new equipment retail store, the center is very popular for weekend checkouts. On weekdays the springs are virtually empty, making them an ideal location for families wanting to combine diving and camping.

Branford Dive Center is also the largest sanctioned training facility for cavern diving in the United States. According to Mayor Broome, the records of the National Speleological Society's Cave Diving Section (NSS/CDS) have proven that statistic for three years running.

Since cavern diving is very specialized and requires a high degree of knowledge and equipment proficiency, numerous signs in the center advise everyone diving the springs to stay well clear of the cavern entrances. Many quickly become inescapable labyrinths to the untrained and ill-equipped. Divers interested in properly learning the techniques of cavern diving can join weekend courses at the dive center, sanctioned by the NSS/CDS, PADI, YMCA, NAUI and the National Association of Cave Divers (NACD). Otherwise, enjoy the springs best by staying well out in open water and experiencing the sensation of being weightless in unbelievably clear fresh water.

Maps with directions to all the springs are available for the asking. Several of the most popular are Yana, Snake Sink, Peacock Spring, Little River Spring and Troy Spring. All have constant year-round temperatures of 72°F.

Yana Spring, a large semicircular basin with a depth of 35 feet, is created by an underground river that opens into a large, wide cavern. Connected to Yana by a 20 foot long, 45 foot deep tunnel, Snake Sink is almost 250 feet long and 30 feet wide. With 50 foot visibilities, the clear green water sink leads, via another tunnel, to Blue Springs-Lafayette, closed to divers at present.

Also created by an underground river that breaks through the surface on the banks of the Suwannee River, Peacock has a cavern mouth less than 20 feet below the surface. Schools of brim and the occasional bass work their way back and forth across its opening. In the river slough lily pads float on the shallow water and create hiding places for minnows and turtles.

Little River Spring is a popular swimming, snorkeling and picnic area. With a shallow opening into a cavern/cave system, access is limited to certified cavern divers. As a place to spend an afternoon with the family it is perfect. A boardwalk down to the spring and picnic area has been built by county authorities.

(Continued on Page 120)

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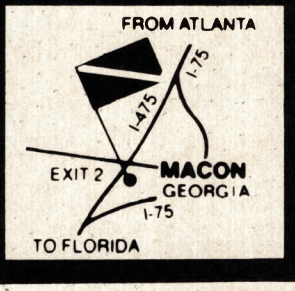

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MY URCHIN EXPERIENCE

BY HILLARY HAUSER

I was diving along this shallow reef off Carpinteria, California, with a net bag in my hand, scooping up sea urchins with a little hand rake and thinking, wow—this is like getting paid a lot of money for picking up Easter eggs.

Little did I know.

I was on a test dive. Two other commercial divers were waiting above to see what I would come back with before they'd agree to take me on as one of their divers. I didn't care that I was the only woman in Santa Barbara enlisting to dive sea urchins commercially—I wanted to pay my bills, that's all.

I was told a person could make $400 a day diving sea urchins and I thought that just two days a month with this diving would fill the holes in my checkbook.

Instead, I got holes in my fingers, my wetsuit and finally the net bag I was dragging around the reef.

Those big bags urchin divers use get heavy when they're filled, so there is always some sort of flotation device attached to them that can be inflated underwater with air from the regulator.

My first mistake in this diving exercise was to fail to notice there was already air in my BC when I jumped into the water. So, while my two would-be partners watched in disbelief, I kicked and kicked and could never get beyond five inches of the surface.

They were laughing like mad when I finally got down to the reef. With my little hand rake I started shoveling black subsea pincushions into my bag like mad.

For an hour I raked and raked.

As the bag got heavier and heavier, I would occasionally take my regulator and blow air into the little flotation device. That way, I lightened the load and continued collecting. My dive was going to produce the greatest harvest known to man.

Finally, I began the long swim back to the boat, dragging my full bag.

Just before I surfaced, however, I turned to see why everything had seemed so light and easy. The slipknot at the bottom of the net, which divers simply pull to unload the sea urchins, had undone itself during my swim back to the boat and every single sea urchin I'd collected had rolled out. They were now spread all over the reef.

There was one sea urchin left—a little purple guy, stuck in the net.

So, after diving for more than an hour, I surfaced to show my fellow divers the little urchin that was tucked in my big mesh bag—and as they laughed, I resigned.

BIZARRE SEAFOOD

(Continued from Page 49)

whelk. He has also had a hand in gooseneck barnacles, sheepcrabs, ocean whitefish, dogfish and ocean sunfish. Kato feels these odd animals have value as table items for man—not just because they are less expensive, but because they have very real gourmet possibilities.

Sea cucumbers taste like octopus, he says. Gooseneck barnacles taste like lobster, as do sunfish. Ocean whitefish, now thrown overboard by fishermen, is delicious in sashimi and "better than any fish on the West Coast." Dogfish (a shark now considered junk fish) is a smoked delicacy in Germany and France.

Of all these creatures, the sea cucumber has come the longest way with Kato's help and there are now fishermen in Santa Barbara who go after them all year.

photo/Bob Evans

Kellett's whelk with eggs

Mike McCorkle, a local fisherman who has been fishing sea cucumbers for about four years, said these bottom-dwelling animals—best described as ugly subsea pickles—are tricky to fish.

"They melt like an ice cube, turn into slime . . . ," he said. "They go from one-half inch thick to an eighth-inch thick and there's nothing left to eat."

McCorkle has sold his sea cucumbers through Mu's Seafood in Santa Barbara, a buyer and exporter of marine oddities. "Mister Mu" has worked closely with Kato, too, to develop ways to market other locally fished creatures. That means that he and Kato get together from time to time to boil up and eat what they think they might be able to market.

To be eaten, sea cucumbers require a complicated preparation, described by McCorkle as a "secret process." "Straight out of the ocean, it's like eating the sole of your shoe," he said. "You have to dry them, then boil them an hour, three days in a row, then chop them up and saute them."

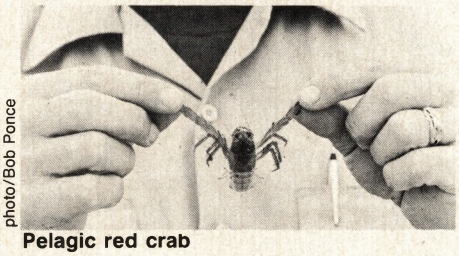
Sea cucumbers are exported to Japan, dried, for use in soup and for pickling and the Chinese buy them for use in various dishes. Mister Mu sells most of his sea cucumbers, however, to the East Coast and Canada.

The Kellett's whelk is another local ma-

rine animal being examined as a possible fishery by Mister Mu and Kato. This is the common mollusk many tidepoolers see on local beaches. Crab fishermen catch them incidentally in their traps. According to Kato, the whelk tastes much like the conch of the Caribbean and can be used raw in sashimi or deep fried, like abalone.

Currently, Mister Mu buys Kellett's whelks from local boats and ships them live to Los Angeles, where they are sold as conch salad. Kato said they can also be eaten boiled, like shrimp, or broiled in the shell with soy sauce.

Kato is also working on the development of a fishery for the pelagic red crabs—the tiny, lobster-like crustaceans that drifted into the channel during El Niño. Red crabs contain carotenoid, a red pigment that may be a suitable substitute for the controversial red food dye. It has also been used successfully in



photo/Bob Ponce

Pelagic red crab

photo/Greg Hufft

Sea urchin harvest

salmon feed—ground up and fed to hatchery salmon in dried pellets, so their meat turns red.

In nature, the flesh of salmon is pink because of the crabs they feed on, Kato said, but salmon raised in hatcheries would have white meat unless they were fed the carotenoid pellets. The public will not buy a salmon that has white meat.

Kato said he eats red crabs—deep fried or mashed into fishcakes. The fishcakes, he said, "taste absolutely good. The only problem is, we can't grind it fine enough and there is a little bit of chiton (shell) in it. Also, you can be eating along and run into a little eyeball."

These things would bother a lot of people, but they don't bother Kato. He admitted, however, that his children don't share his enthusiasm for seafood.

"My kids won't eat all this," he said. "They love hamburgers."

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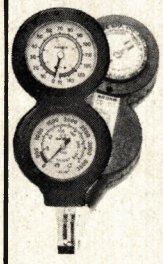

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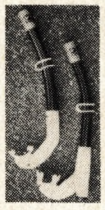

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BRANFORD

(Continued from Page 117)

Troy is probably the most popular of all the springs. A large, circular hole with depths reaching 80 feet, its fast flow has recently created an archway beneath the rocks in its center. In its entrance to the Suwannee River lies the ribs of the Civil War era river steamer *Madison*. Scuttled in 1863 by her captain to keep her out of the hands of Yankee soldiers, she was quickly plundered of every usable part. Captain Tucker left her to fulfill his dream of leading a company of Confederates. The entire story is told in the September '84 issue of SKIN DIVER.

In addition to the springs, many come to find lost "treasures" at the bottoms and float on the surfaces of the Suwannee, Santa Fe and Ichetucknee Rivers. Many Indian artifacts as well as old bottles and prehistoric fossils have been found in these waterways. The Ichetucknee is quite clear, but the Santa Fe and Suwannee offer only brown water diving. Canoers find the surfaces of these darker waterways perfect for scenic exploration. The Ichetucknee is very popular for lazily drifting downstream on an inner tube.

Hotel accommodations and camping are readily available within a short drive of the dive center. For a complete description of hotels, services and diving in the Branford area call (904) 935-1141, or write: Mayor Gene Broome, Branford Dive Center, P.O. Box 822, Branford, FL 32008.

DIVING MEDICINE

(Continued from Page 16)

during the 36 hour period.

The decompression is started in the evening after a long day of diving and no one minds sleeping late the next morning. This day is spent packing, reviewing TV movies of the divers, watching the world news and getting a tour of the working areas of the habitat. There is a fine banquet that night and the late evening is spent examining the night reef. By bedtime, the pressure is equivalent to 20 feet and by morning, one atmosphere.

The ride up the elevator to the surface is like a tunnel to another world. On the hydrofoil back to the mainland, plans are made for similar trips to the Barrier Reef and Antarctica in coming years. There is no delay in getting aboard the plane home; the cabin pressure is at one atmosphere in the supersonic flights.

Will we be diving this way in 2035? All of the technology is now available and much of it is in use today. New developments in electronics, medicine, power generation, communications, transportation and marine engineering will make vacations like the one described here possible and perhaps even routine.

SHARK CONFERENCE

(Continued from Page 96)

ing his career. He was only bitten once—by a three foot sandbar shark that nipped him on the finger. A sandbar shark caught off the west coast of Florida this year was tagged by Casey in Delaware in 1965. Sandbar sharks have a 25 to 30 year life span and are used in aquaria because of their adaptability to confinement and their attractive appearance.

Jack Musick, Virginia Institute of Marine Science, has studied dusky, blacktip, lemon, bull, hammerhead and sandbar sharks on inshore areas and says a shark attack is a rare phenomenon. A young man snorkeling near shore off Virginia was nipped by a blacktip shark. But it was discovered later that he was downstream from a menhaden vessel that was discharging blood into the water while processing fish.

Sam Gruber, Rosentiel School of Marine Science, Miami, Florida, is working on a shark repellent for divers. A small canister attaches to a speargun and upon demand emits anti-shark chemicals. Gruber says it's like getting soap in your mouth. It drives sharks away instantly. It has worked so far on blues in California and the Bahamas.

Jackson Andrews, curator of the National Aquarium in Baltimore, stood at the rostrum in a large auditorium, about 50 paces from his institution's 220,000 gallon shark display tank. Jackson helped catch and care for some of the tigers, lemons, leopards, bonnetheads, nurse and other species that thrill the 1.4 million visitors who pass through the four year old facility annually. Jackson said, "Stabilization and transportation to the aquarium are two crucial steps after capture. The circulatory system of sharks is very delicate. They need oxygen in pure water and constant changes of water while being transported in the holding tank. Then they've got to adjust to their new home and other sharks in the display tank."

Nick Brown, executive director of the National Aquarium in Baltimore, aptly summarized the philosophy of the symposium when he said: "Sharks will always be crowd pleasers because of myths. We hope to dispel some of these myths and challenge the world's experts at this gathering to continue their profound discoveries. The dedication and knowledge of these people will not only help to define the current state of the art in maintaining sharks in captivity, but will also give future direction to this important work."

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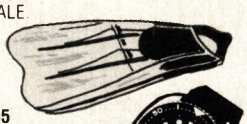

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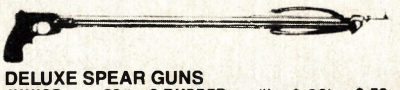

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PACIFIC NORTHWEST

(Continued from Page 82)

the jetty itself, a breakwater for the adjacent ferry terminal. This manmade structure of piled rock rubble supports a variety of marine species and appears to be blessed with clear water most of the year. As a result, it is a favorite spot for photographers. Additionally, this area has been designated an underwater park by the state, thus the numerous fish are tame and approachable. The second dive is on the remains of a large pier structure south of the jetty. Maximum depth at the end of the jetty is 50 feet, less at the pier. Tide tables should be consulted.

Moving south once again, the Edmonds Wrecks, just north of Seattle has got to be the most heavily dived site in all the Pacific Northwest. Like Keystone, it too, is an underwater park. Roughly 200 yards offshore are the remains of two intentionally sunk drydocks and a wooden barge in 25 feet of water. With easy beach access and little current this site is a favorite for beginning divers. Floating rafts are permanently anchored over the wrecks and act as a rest platform after the long swim out. One can also follow anchored lines underwater, which lead from the shore directly to the wrecks. Edmonds is also a favored night dive.

Blakely Rock, one-quarter mile offshore Bainbridge Island, is known for its thick kelp bed and series of rock ledges terminating at 60 feet. Accessible only by boat, the northern side drops off more slowly, providing ideal snorkeling.

The major waterway connecting the upper and lower sound is known as the Narrows, and at its bottom lies the wreckage of the suspension bridge known as Galloping Gertie in about 60 feet of water. Swift current makes this an advanced site and there are really only a few days in the year when it can be dived safely. Large lingcod and octopus make their homes in the wreckage, as well as in the caves and ledges lining the shores of the Narrows.

Just south and around the bend from the Narrows is Day Island, known as one of the best wall dives in the lower sound. Beach access is available, with approximately a 50 yard swim out to the edge, which begins anywhere between 40 and 70 feet. The conglomerate rock wall provides sites of attachment for scallops and hiding places for octopus and wolf eels. Heavy current exists here as well.

Right next door is Titlow Beach, with less current and the remains of an abandoned ferry dock 50 yards offshore. The numerous pilings of the dock are completely covered by white, apricot, green and red plumose anemones. On a clear fall day the view from 30 feet looking up through this mass of anemones rivals any tropical reef scene around.

WRECK FACTS

(Continued from Page 14)

baul and needs Scott's input. If you can help her, write to her at Box 500, East New Britain, Papua New Guinea.

Douglas Campbell, Alexandria, Virginia, is compiling a list of sunken aircraft. He says there are more than 100 of them at the bottom of Lake Washington near Seattle—the final approach for trainers landing at Sand Point Naval Air Station. Doug is interested in others, in the Great Lakes, off our coasts or in any other areas—as long as they are sunken aircraft. Write to him at 6203 Yellowstone Dr., Alexandria, VA 22312.

Bill Campbell, Warwick, Rhode Island, has a slide presention featuring wrecks off the state's coast. The show includes two submarines—the *U-853* and the USS *Bass*—the *Andrea Doria*, the freighter *Black Point*, the sidewheeler *Larchmont* and more. Contact Bill Campbell, P.O. Box 8986, Warwick, RI 02888.

Sherman Swofford and David Scoggins, Jacksonville, Florida, report that Ralph Buchman recovered a Spanish two reale coin from the wreck of the galleon *El Enfante*, one of 19 Spanish Plate Fleet vessels that sank in a hurricane in 1733. Diving from the *Lady Cyana* out of Islamorada, Ralph fanned the sand until he uncovered the coin whose mint markings are still discernible. Divers still bring up an occasional coin, cannonball or piece of pottery from *El Enfante* and her sister ship, *El Capitan*, whose ballast stones and timbers are scattered over the reef.

If you're planning a trip to Bermuda, don't go without a copy of *Guide to the Alternative Bermuda* by Nelson Hay. The small, handy pocket guide includes everything to do and see in Bermuda. Chapter 12 of the 18 chapter book is devoted to snorkeling and scuba diving, while a map in the front depicts popular dive sites and locations for the wrecks *Montana* and *Constellation*. The major strength of the book is a rating of accommodations in various guest houses and small hotels where you save money, avoid crowds and meet hospitable Bermudian hosts. This is what Nelson Hay means by the "alternative Bermuda." The author lived in Bermuda six years and has been diving for 24 years. Order the book from Blue Sea Press, P.O. Box 9426, Arlington, VA 22209-0426—$8.95 plus $1.50 postage.

By coincidence, I came across a free booklet entitled, *Where to Stay in Bermuda*, published by the Bermuda Department of Tourism. I looked up some of the guest houses and small hotels mentioned in Nelson Hay's book and, as luck would have it, they were there, including color shots of structures, surroundings, views and proximity to beaches. The booklet is a meaningful counterpart to Hay's guide. It also features a functional map on the back cover that clearly designates the

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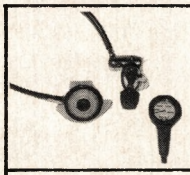

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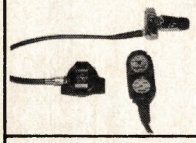

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Package 7S- Yellow/black vented fins, black/yellow U.S. Divers Nova mask, snorkel. Retail $100.00
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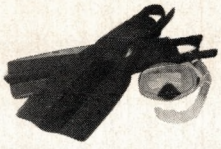

Package 8S- Long blue/black O.H. fins, Silicone mask with blue rim, silicone snorkel with blue bore. Retail $129.95
Sale $85.95

Package 9S- Shoe fins (Specify foot size), contoured snorkel, mask with yellow rim. Retail $89.00
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Package 10S- Clear Contact fins, Silicone mask, Silicone clear snorkel. Retail $121.00
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WRECK FACTS

three major areas of the fishhook-shaped island. The booklet is free from the Bermuda Department of Tourism, Suite 646, 630 Fifth Ave., New York, NY 10111.

Val Martin, who specializes in books about shipwrecks, adventure and Florida human interest, has two shops now: Florida Classics Library, P.O. Drawer 1657, Port Salerno, FL 33492 and P.O. Box 1028, Hobie Sound, FL 33455. Write to Val for a free brochure.

Correction: Florida Congressman Charles Bennett did not say, "All divers are looters," as quoted in Wreck Facts, February and May 1985. He said, "Federal courts apply the maritime law of salvage to sunken wrecks and thus encourage commercial looting of these historic remains." (Statement before the House Merchant Marine and Fisheries Committee, Sept. 27, 1983). Senator Lloyd Bentsen said, "Salvors loot our territorial waters of a wealth of historical treasure." (Miami Herald, Oct. 22, 1983). Therefore the term, "looting," by politicians who favor passage of the Abandoned Shipwreck Act, has been aimed at commercial salvors, not "all divers."

Safe diving to all. Be sure to include a stamped, self-addressed envelope when writing: Ellsworth Boyd, 1120 Bernoudy Rd., White Hall, MD 21161.

SPANISH/SOUTH COVES

(Continued from Page 75)

powered by 671 GM diesels and one trihull flattop powered by outboard engines. Each boat could easily handle up to 24 divers, although in practice a group of 12 to 16 is more common. With the existing fleet, at least 120 divers could be comfortably accommodated at any given time, a number well beyond the projected capacity of even a full house of divers (92). Two of the fiberglass V-hulls are brand new and the other vessels are reasonably new as well. The other aspects of the dive operation are similarly overengineered. For example, two compressor systems work in tandem to pump 65 cfm with 10,000 cubic feet of storage.

During my visits to Spanish Cove, I find the underwater photo center the hub of my personal activity. For the visiting photographer, the center can provide E-6 film processing, film and battery sales, camera equipment rentals, custom color prints, custom underwater videos, some equipment sales, underwater portraiture and photographic instruction. Terry Patterson is the resident photo pro and Harry Ward is greatly involved in the photo programs as well. There is constantly some underwater photo activity underway, whether it is the weekly photo contest among the guests, underwater video sessions or multi-projector slide presentations. For instructors wishing to bring groups, the lecture facilities and editing areas are accessible upon request.

The Spanish Cove dive itinerary includes a healthy selection of North Wall sites. No other resort is able to offer such short boat rides to the North Wall. Notable for its sheer vertical drop-offs and its population of prolific pelagics such as spotted eagle rays, turtles and rare, but exhilarating, sighting of sharks, the North Wall is premium dive action. Tarpon Alley is perhaps the most famous North Wall site with its predictably huge school of glimmering tarpon and the nearby Valley of the Rays where southern stingrays lie buried in the sand. Photographically, the potential along the North Wall is staggering, but the weather is not always conducive to diving this area. Other, better protected dive sites Spanish Cove has in common with South Cove and other dive operations on the island include: a whole series of mini-walls along the west side dropping from 35 to 65 feet; "name" dive sites such as Trinity Caves, Orange Canyon, Sand Chute, Big Tunnels, the *Oro Verde*; and one of the best night dives in the Caribbean, the wreck of the *Balboa*.

South Cove Resort shares much of the same overt dedication to providing services for the traveling diver that is apparent at Spanish Cove. In fact, South Cove advertises itself as "the dedicated dive resort for dedicated divers." This is in recognition of its emphasis on the scuba program, but this is not to imply austere accommodations or the absence of activities for the non-diving spouse. On the contrary, South Cove has been completely renovated including new paint, floor coverings and linens in the rooms; an expanded boat dock with improved shore access; a modern and upgraded underwater photo center with E-6 film processing and camera rentals; a remodeled kitchen, bar, and dining facility; a new guest gear storage building; and an expanded dive center. In short, if you haven't been to South Cove in the past nine months, you haven't been to South Cove.

The hotel management team of Steve Knight and Terri Hodges was involved with Spanish Cove for several years before turning its talents to the operation of South Cove. Their goal has been to maintain the friendly, intimate atmosphere of the resort while improving the physical aspects and upgrading guest services. With only 22 rooms, the hotel's guests come to know one another by week's end. It is not unusual to see friends from one year returning together for a dive vacation the next.

The fleet of dive boats at South Cove is more than substantial and includes the 38 foot Delta *Cove Diver*, formerly the flagship of the Spanish Cove fleet; the *South Wall Diver*, a 41 foot diesel Bruno-Stillman; and the *Moray Diver*, an island built deep V-hulled vessel. Whereas Spanish Cove tends to dive along the north and west shores of Grand Cayman, South Cove tends to dive west and south. Since there are reciprocal diving privileges at both resorts, the range of diving is incredible. South Cove will typically visit an area from Hepp's Pipeline (around the northwest point) to and including the South Wall. This will encompass such areas as Trinity Caves, Orange Canyon and the *Oro Verde* as previously discussed and will also include Devil's Grotto and Eden Rocks as well as some truly magnificent dives along the south shore. The weather does not always permit diving this wall but when it does, the sights are remarkable. It begins at 60 to 70 feet at a very vertical drop-off with tunnels and multi-hued sponges providing relief to the blue abyss. There are schools of jacks and Atlantic spadefish frequently encountered, as well as groupers, angelfish, ample black coral and rather unusual quantities of conchs in the sand at 80 feet. If Grand Cayman diving ever begins to feel redundant, try the South Wall, for most of this has never been explored. While some areas may feel tame, this is wild, virgin territory.

The most famous South Cove dive site lies just offshore the resort at the famous Waldo's Lair. Known for the huge but friendly green moray eels that inhabit the reef, Waldo and Waldene, Waldo's Lair is also home to a huge black grouper named Bugsy, several cooperative Nas-

(Continued on Page 131)

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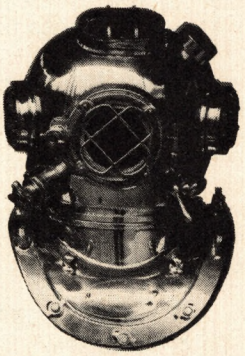

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EXCLUSIVE REPORT

NIKONOS 20mm Lens

An ultra-wide angle underwater lens at a reasonable price

TEXT AND PHOTOGRAPHY BY GERI MURPHY

The Nikonos 20mm Ultra-Wide Angle Lens bridges the gap between the 28mm and 15mm underwater lenses—at less than half the cost of the latter. With nine precision ground glass elements in seven groups, its angle-of-coverage underwater is a full 78 degrees.

Perhaps the biggest news this year for underwater photographers is Nikon's introduction of a brand new Nikonos 20mm ultra-wide angle submersible lens. This lens fills the gap between the present 28mm semi-wide angle and the very expensive 15mm extreme wide angle lenses. It provides the Nikonos owner with an inexpensive alternative in underwater wide angle lenses without sacrificing the superb image sharpness for which Nikon lenses are so well known. Best of all, the new 20mm will fit all Nikonos models, I through V.

BASIC DESIGN

The Nikonos 20mm lens is an interesting hybrid of technology. It resembles the external configuration of the 35 and 28mm lenses, with the two control knobs positioned directly opposite each other and all control scales marked on the knobs. The user handles the 20 in the same manner as the older 28mm. Yet, the new 20 has many of the characteristics found only in the 15mm lens. For example, it allows you to set lens focus at a minimum distance of 1.3 feet.

Also, the new 20mm lens is strictly for underwater use. It features a high grade optical glass dome port that must be underwater to provide the final element of the lens formula.

Like all previous Nikonos lenses, the new 20mm has all metal construction and is fitted with the same spring loaded bayonet Nikonos mount. The only thing the 20mm will not do is function with the Nikonos Close-Up Kit.

SPECIFIC FEATURES

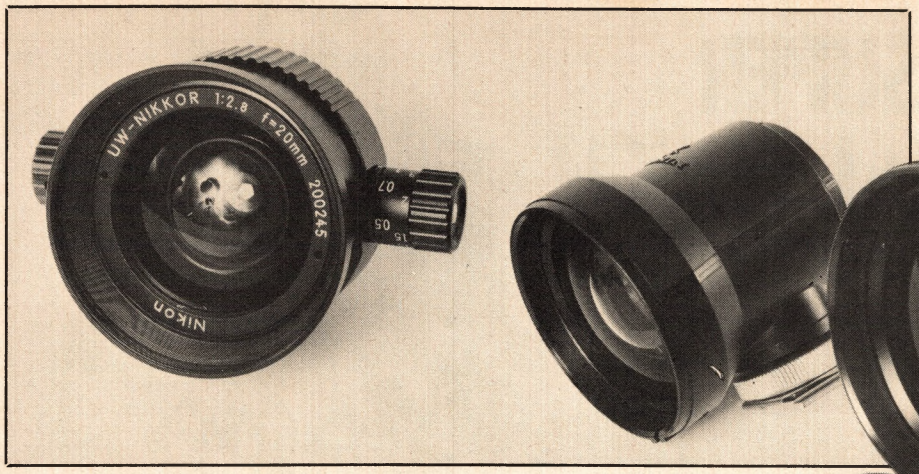
Let us go over some of the specs and features of this new Nikonos wonder lens. It has a focal length of 20mm, which places it halfway between the 28 and the 15mm. The underwater angle-of-coverage is 78 degrees and the depth-of-field is definitely impressive.

The new lens is all high grade glass, consisting of nine elements positioned in seven groups. The glass itself is made by Nikon and then ground and assembled at the Nikon factory. The quality and performance is definitely superior to anything in U/W lenses in this focal length.

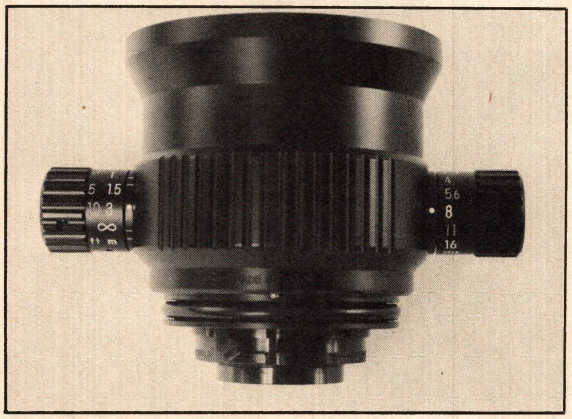
The Nikonos 20mm lens features seven different aperture settings ranging from f/2.8 to f/22. The aperture control knob offers positive click-stop settings at each marking. However, the aperture can be set between two markings if desired.

NIKONOS U/W LENSES

Model	U/W Coverage	Max. f/stop	Min. Focus
15mm UW-Nikkor	94°	f/2.8	1.0 ft.
20mm UW-Nikkor	78°	f/2.8	1.3 ft.
28mm UW-Nikkor	59°	f/3.5	2.0 ft.
35mm W-Nikkor	46.5°	f/2.5	2.7 ft.
80mm Nikkor	22.7°	f/4.0	3.0 ft.



The 20mm lens works best in conjunction with the 20mm Optical Viewfinder. The viewfinder slips into the Nikonos shoe mount and is secured with a stainless steel locking spring and screw down knob.



The focus knob has markings in feet and meters. The aperture control can be set on or between markings.

The viewfinder has a parallax correction, fixed at an estimated distance of five feet U/W.

The focusing control offers a distance scale ranging from 1.3 feet (0.4 meter) to infinity. The scale is calibrated in both feet (orange numbers) and in meters (white numbers). The foot scale has specific markings at the distance settings of infinity, 10 feet, 5 feet, 3 feet, 2 feet, 1.5 feet and 1.3 feet.

In addition to distance settings, the focus knob also features depth of field indicator marks for three different aperture settings: f/11 (red), f/5.6 (orange) and f/4 (yellow).

The front lens shade is threaded to accept 67mm screw-in filters—a common size available in most photo and some dive stores. One word of caution, however, the use of filters may cause slight vignetting owing to the ultra-wide angle.

Front and rear caps are supplied with each lens. The front cap is a plastic press-on type and replacement should be inexpensive. The rear cap is standard for a Nikonos bayonet mount.

20MM VIEWFINDER

In addition to the 20mm lens, Nikon is also introducing a Nikonos 20mm Optical Underwater Viewfinder. This item is optional and does not come with the lens. However, it is strongly recommended as a necessary accessory since it is perfectly matched to the lens.

The 20mm viewfinder has a plastic body with high grade optical lens elements that produce a bright image. It is extremely lightweight and compact.

The viewfinder has a metal mount that slips into the accessory shoe on top of the Nikonos camera. One especially clever feature of the new viewfinder is a screw-down attachment that features a special stainless steel locking spring. Once the screw knob is turned down, the viewfinder cannot slip out of the mount.

The viewfinder has a built-in parallax compensation, fixed at an estimated underwater distance of five feet. It comes with a mask for the 28mm lens that cuts down the picture area and repositions the parallax compensation at seven feet.

PERFORMANCE

Early performance testing of the Nikonos 20mm lens by expert underwater photographers such as Stephen Frink and Frank Fennell has produced exciting results. There is absolutely no vignetting nor barrel distortion at any f/stop or focus setting. Images are extremely sharp throughout the entire f/stop range.

The new 20mm lens performs especially well at minimum focus distance for ultra-wide angle close-ups. At a setting of 1.3 feet and an aperture of f/22, the depth-of-field is estimated to range from 11 inches to 27 inches. This means a Nikonos user could sharply focus on a clownfish peeking out of an anemone in the foreground, with an observing diver fully framed and focused in the background. What a shot that would make!

CONCLUSION

The new Nikonos 20mm Ultra-Wide Angle Lens is listed at $462—less than one-half the price of a 15mm ($1,150). The new 20mm Optical Viewfinder (DF-12) lists for $131, nearly one-half the cost of the 15mm viewfinder (DF-11, $250).

Considering the attractive pricing and performance of this remarkable lens, I would rate the new 20mm as Nikon's "best value" in underwater lenses. And, the good news is it is available right now.

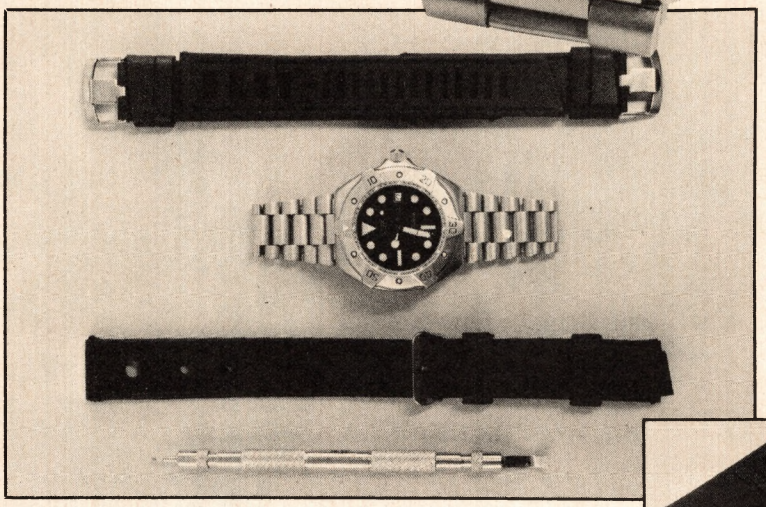
For more information, see your authorized Nikonos dive store dealer or write to: Frank Fennell, Nikon Inc., 623 Stewart Avenue, Garden City, NY 11530.

HEUER SUPER PROFESSIONAL WATCH

A Serious Diving Instrument For The Professional Diver

TEXT AND PHOTOGRAPHY BY GERI MURPHY

The Heuer Super Professional has a heavy stainless steel case and a sapphire crystal that's impervious to gas invasion. It's rated to 3,300 feet.



The Super Professional has a heavy duty, one way bezel and luminous hour positions on a black background for easy reading in dim light. It comes in a leather case with three wrist bands and an adjustment tool. One rubber strap has a five inch extension for wearing over a wetsuit sleeve.

Why would anyone pay $1,500 for a dive watch? The question can be answered in one word—quality. You are paying for the best materials, time consuming assembly, extensive testing and long lasting performance. It is the kind of superior quality rarely found in standard, mass produced consumer products. It's the kind of quality reserved for handmade professional products; the kind that lasts a lifetime. Consider, for example, Heuer's newest offering, the Super Professional Watch, its top-of-the-line model.

At depth, time can be the diver's greatest enemy. Every minute counts and timing becomes critical. The Super Professional is a watch designed with one purpose in mind—life support for the serious diver. It is extremely reliable, with an automatic movement. Because of this the watch does not have to be returned to the factory every two years for battery replacement. Also, the back of the watch does not need to be opened for a battery change. The Super Pro is large—one and three quarter inches in diameter and one-half inch thick—heavy (six ounces) and extremely rugged. I suspect you could crack walnuts with it, but I would not recommend this!

Here are some features that separate the Super Professional from other Heuer watches. The watch mechanism is cradled in a one-piece, heavy stainless steel case that is as tough as a bank vault. There's no screw-down back to worry about. The watch's weight is owing to this incredible case.

The crystal is made of expensive sapphire. It is perfectly flat, scratch resistant, reflection free and impervious to gas invasion. The winding stem is O-ring sealed and features a screw-down crown. It takes one and one-quarter turns to open it.

Each watch is pressure tested to a depth of 3,300 feet (1,000 meters), a lot deeper than most divers—even commercial divers—plan to go.

The Super Pro features a giant bezel—a one-quarter inch wide ring that measures two inches at the outside diameter. Six large, raised wedges spaced around the bezel allow easy grip and turning even with a wetsuit glove or mitt. The bezel is gold plated for high visibility and corrosion resistance. The bezel's minute divisions are clearly engraved: 10, 20, 30, 40, 50 and a triangle symbol for zero/60. The triangle and a series of dots between the numbers are luminous (tritium) for easy reading in dim light. The bezel has a uni-directional ratchet (counterclockwise) with audible click stops.

The watch face is another sterling example of superb craftsmanship. Extra large luminous dots (tritium) are set against a black background. Each dot marks an hour position. A special triangle marks the 12 o'clock position and flat bars indicate six and nine o'clock.

The hour, minute and sweep second hands are gold plated with engraved bands and dots of luminous tritium.

The watch can be easily read in complete darkness or bright daylight. It is perfect for night dives, cave exploration or shipwreck diving. There is a small date window at the three o'clock position.

Now, for that touch of class: The watch comes in a leather tool case containing a selection of three wrist bands, a tool for installing the bands and even plasticized repetitive dive tables.

You have a choice of wearing the Super Pro with its stainless steel bracelet or two different rubber straps. One of the latter comes with a five inch extension for wearing over a wetsuit.

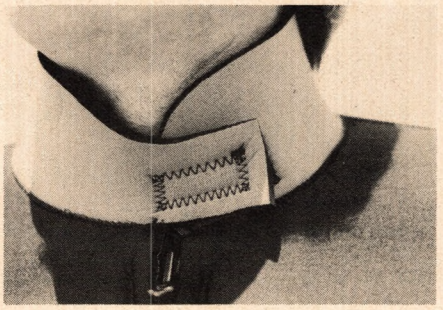
The Heuer Super Professional (catalogue number 844.006) lists for a breathtaking $1,525. It is the most expensive non-gold dive watch in the entire Heuer collection (116 underwater models). Is it worth it? It is if you are a professional diver, serious about your craft. For more information see your local Heuer dive store dealer or contact: Heuer Time & Electronics Corp., 960 South Springfield Ave., Springfield, NJ 07081; (201) 467-1890. The West Coast office is at: 1900 Avenue of the Stars, Century City, CA 90067; (213) 556-8208.

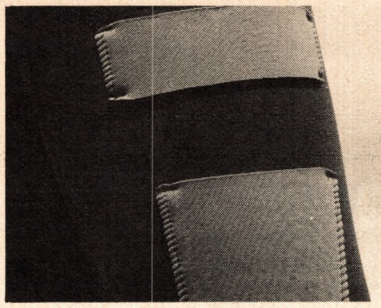
THE SEA RAY
An Economical Quality Wetsuit

TEXT AND PHOTOGRAPHY BY FRED FISCHER

If you like to shop by phone, then a call to Sea Ray may end your search for a new wetsuit. The company manufactures a variety of 1/4 and 1/8 inch wet and drysuits for men and women. Standard sizes are available for divers who weigh 100 to 270 pounds and have normal proportions. Colors are blue/black for men and blue with silver for women.

Because of its wide popularity the 1/4 inch Sea Ray farmer john suit was provided for evaluation. It is made from Sheico rubber laminated on both sides with a nylon-Lycra fabric, which has an attractive sheen. The seams are glued and then stitched on both sides. To prevent leaks the needle never penetrates all the way through the fabric. The end of each seam is bar-tacked for additional rip protection.





The zipper on the jacket has heavy duty, non-corroding plastic teeth, which are interlocked by a metal slide. The tail is secured in front with two metal locks. The fit of the three inch collar is generous enough for a cold water hood and is held shut with a Velcro® tab. Diamond patterned inserts under the arms reduce wear by dispersing the stress points. Royal blue arms and collar are contrasted by a black body. Both shoulder straps on the farmer john close with Velcro. A diamond patterned insert is also provided in the crotch area for seam stress relief.

I would recommend spending an additional $25 for the deluxe package. All of the edges are bound to prevent rips. This is especially important in the wrist and ankle areas. Blue knee pads are applied for wear resistance. A spine pad fills the depression in the diver's back for additional warmth. Twist locks on the tail are replaced with Velcro closures. There is a knife pocket on the thigh for easy access. The corners of the pocket are bar-tacked for strength.

I called the Sea Ray toll free number to find out what was involved in ordering a 1/4 inch farmer john suit with jacket. John Muscarello, the owner, explained the only measurements necessary for a man are height and weight. Women should be prepared to give their bust size in addition. A hat size is required for the hood, hand size for gloves and shoe size for booties. Shipment will be made on the same day if the order call is received before 3:00 pm Eastern time. Muscarello emphasized that the fit is guaranteed. If the suit is returned—unused in the water—he will make a full refund. Some types of alterations are available for an additional $15. Muscarello described a method for marking baggy areas with chalk so material can be removed. Inserts are not possible in areas where the suit is too tight.

In conclusion, I found the $129.95 ($134.95 for women) Sea Ray farmer john to be an excellent value. The workmanship is excellent. For me, the fit was quite acceptable, although the jacket was a bit short on my extra long arms. For more information visit your Sea Ray dealer or call (800) 654-5554; (516) 667-7249 in New York state.

Diving News From Down Under

Heron Island Update

TEXT AND PHOTOGRAPHY BY GERI MURPHY

Heron Island, long established as one of Australia's premier dive resorts, has recently made a number of interesting additions to its already full line of underwater facilities and services.

Perhaps the biggest news announced by this resort is the addition of a new reef exploration vehicle known as the *Subsee Explorer*. Designed by an English engineering firm and manufactured in Cairns, Australia, this unique vessel allows 30 nondivers to stay dry while viewing the undersea wonders of the Great Barrier Reef through the hull. This innovative semi-submersible craft is approximately 43 feet long, 11 feet wide and is powered by an outboard engine. Passengers enjoy an airy, non-claustrophobic environment while drifting leisurely over coral lined pools, through schools of shimmering fish and sculptured passageways of living reef ecosystems.

Reef exploration trips of one hour duration are currently conducted two to three times daily for resort guests. A slightly longer trip at dusk serves champagne to hotel guests while they observe the undersea reef system as its nocturnal activities begin.

For hardcore scuba divers Heron Island has added a high tech, high voltage experience. The resort has acquired four Tekna DV-3X diver propulsion vehicles for reef cruising. Looking more like sleek red racing machines from an underwater movie script, the Tekna dive vehicles are hydrodynamically designed to move through the undersea world at speeds of two mph with minimal resistance. The DV-3X is equipped with a variable pitch propeller offering nine different settings, a maximum running time of two hours and a range of up to three miles. The only problem at Heron Island so far is finding any diver willing to settle for only one dive with this unique machine.

The mere mention of the diver vehicles quickly brings a smile to the face of Heron Island's newly appointed divemaster, Mark McKillop. Originally a New Zealander, Mark has spent most of his life living on the Queensland Coast and has been part of the Heron Island divemaster team for more than three years. His charming, gregarious manner and attention to diver comfort are well remembered by visitors to this island resort.

Heron Island's new semi-submersible reef cruiser, *Subsee Explorer*, lets passengers observe the marine environment while staying dry and comfortable.

Heron Island is probably the most unusual dive resort in the world. It sits in the center of a 50 square mile national marine park comprised of 16 coral atolls, islands and living reefs. Heron itself is part of the park, serving as a bird sanctuary and turtle nesting ground.

A tiny speck in a giant ocean, Heron is barely one-third of a mile long and only 330 yards wide. It is basically a coral cay covered with trees and brush and ringed by a white sand beach.

One small corner of this island is occupied by the resort, the remaining island is a wilderness refuge for 40,000 sea birds and at least six species of turtles.

Surrounding Heron Island is a vast city of coral reef structures, built up over the last 18 million years. The island is but a tiny portion of a huge double reef system that stretches for miles. You can actually walk on the top of this reef during low tide, visiting hundreds of intriguing tide pools, crevices and tidal channels.

Heron Island is near the southern end of the Great Barrier Reef. It lies 50 miles off the Queensland Coast, right on the tropic of Capricorn. The climate is perpetual summer with temperatures ranging between 75 and 90°F and the edge of the Great Barrier Reef is 12 miles away.

The resort has a tropical village atmosphere. Footpaths or narrow roads connect all of the 35 small buildings and guests walk everywhere. There are no cars, trucks or motorcycles. The only form of transportation is the tractors used for hauling luggage, scuba tanks and boat launching.

The resort has 70 rooms and suites that can accommodate up to 230 guests, yet the resort never appears crowded. The only time you ever see everyone is at mealtimes when guests congregate in the giant dining room. The meals are delicious. Breakfast and lunch are served buffet style with fresh fruits, vegetables, meats and fish.

Recreational facilities include a large freshwater swimming pool, game room, a cocktail lounge, a dance area and a tennis court. Special activities include walking tours that cover more than one-half mile of the reef. Guests are provided with tennis shoes and walking sticks. There are also guided bird watching tours during which guests earn about the 20 different species of birds that live on Heron. From October to March there are turtle watching tours and guests have an opportunity to see these magnificent reptiles lay their eggs.

For more information about Heron Island contact Dive In Australia, 680 Beach St., Suite 340, San Francisco, CA 94109; telephone (415) 928-4480.

SPANISH/SOUTH COVES

(Continued from Page 125)

sau groupers, several spotted morays, a couple of resident barracuda, assorted reef tropicals and a school of southern sennet. Several times each day divemasters will take ballyhoo to the reef to initiate a circus of fish feeding and remarkable fish/diver interaction. The eels swim freely, seeking handouts, while the groupers await an opportunity to dart in for a morsel. The wrasse sneak in while the larger predators are occupied. Always at the periphery is a barracuda, just waiting.

Both Spanish Cove and South Cove Resorts offer significant value in a Grand Cayman dive vacation. For further information or reservations please phone toll free (800) 231-4610; in Florida, (305) 381-9954. Mail inquiries should be addressed to Columbus Tours, One Biscayne Tower, Suite 3660, Miami, FL 33131.

TECHNIFACTS

(Continued from Page 22)

ent, Navy ratings include: Master Diver, Saturation Diver, Diver First Class, Medical Deep-Sea Diving Technician, Diver Second Class and Scuba Diver.

It should be pointed out that the term Master Diver can, and often should, be applicable to all classes of diver other than just to Navy personnel. Master craftsmen, whether diver, carpenter, mechanic or whatever, are those who are exceptionally skilled in an art, craft, or science and whose skills or experience qualifies them to practice their craft without supervision and to train apprentices. Probably even master scuba diver would be appropriate if a person did, in fact, meet the above qualifications.

Open sea divers also use many types of equipment but, usually required by law, it involves surface supplied air. In many types of open sea diving the trend is now toward bandmask or hookah equipment. These divers may be engaged in harvesting any sea products and usually earn less than their commercial counterparts but find the challenge of an independent operation rewarding, with a tremendous opportunity to become familiar with the ocean.

Bell divers may also be found in commercial and military diving. Some of the equipment used is, in fact, nothing more than a diving bell. Other equipment, while still working at one atmosphere of pressure, is maneuverable and, consequently, classed as manned submersibles. One, the *Ben Franklin* that did so much work in the Gulf Stream, is the size of a small military submarine.

As the name implies, research divers are those who work underwater to study marine or freshwater conditions. As stated earlier, marine research divers have been around for a long time. Originally they used bells (Barton and Beebe) and then open helmet gear (Du Pont and others). Predominantly, research divers now use scuba, although some are qualified in the use of bandmasks and the lightweight helmets. Underwater research is one of the largest users of manned submersibles since this equipment lets users work at the greatest depths.

A recent interesting development in research diving is that OSHA (Occupational Safety and Health Administration), the governing organization for workers' health and safety, exempted research divers from the restrictions imposed by the commercial diver union (the United Brotherhood of Carpenters and Joiners). OSHA claims the union doesn't represent the specific needs of scientific divers.

As a matter of interest, OSHA defines scientific diving as "diving performed solely as a necessary part of scientific, research or educational activity by employees whose sole purpose is to perform scientific research tasks." OSHA went on to say that scientific diving does not include anything normally considered work performed by commercial divers: moving or placing heavy objects, pipelines, demolition, underwater welding, cutting or the use of any explosives.

A final thought with reference to diving regulations: One of the reasons OSHA omitted research divers from the restrictions of the commercial diving union was their excellent safety record. That sport diving is free from any governmental rules and regulations is the result of our excellent safety record. Every diving organization, whether manufacturer, distributer, dealer or instructor, should periodically review its contribution to sport diving to be sure that what it is doing is in the best interest of sport diving safety and of the sport itself. While OSHA is concerned only with employee safety and health, other governmental groups could impose restrictive regulations if diving for fun ceases to be safe.

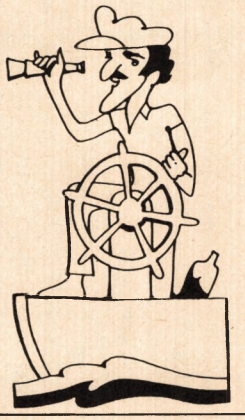
PARKWAY BC RECALL

Certain buoyancy compensator fittings made by Soniform, Inc., in early 1985 and used on two Parkway BCs are being inspected and repaired by Soniform, Inc. These BC fittings may leak air and cause loss of buoyancy control by scuba divers.

In the Parkway line, the fittings were used in the Economy Jacket, model SYS-2000 and SYS-2100, and the Ocean Jacket, model 50000. If you own one of these Parkway models return it, collect, for retrofit to: Soniform, Inc., Dept. R, 1908 Friendship Drive, El Cajon, CA 92020. Turnaround time will be approximately 7-10 days.

Parkway is asking diving specialty shops, air fill stations and other distributors of scuba diving equipment to help in locating owners of these buoyancy compensators.

WHERE TO GO



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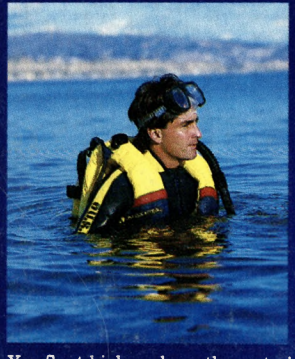

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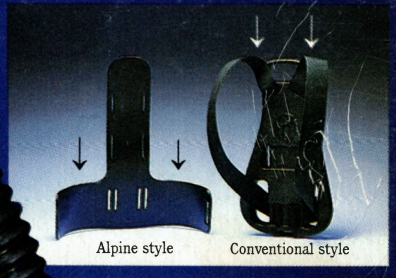

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